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(221 p., 8 pl.)

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An ancient Chinese treatise on alchemy entitled Ts'an T'ung Ch'i

Written by WEI PO-YANG about 142 A.D.,
Now Translated from the Chinese into English
by
LU-CH'IANG WU

With an Introduction and Notes
by
TENNEY L. DAVIS

Massachusetts Institute of Technology
Cambridge, Mass.

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PREFACE

The present translation of the *Ts'an T'ung Ch'i* (參同契) (11548, 12669, 1053) is believed to be the first translation into a European language of the entire text of a Chinese treatise on alchemy. Apart from its antiquity and its obvious interest, it has the value for Occidental scholars that it supplies source material for study in a largely unexplored field of the history of science. This value will increase in the future. One portion of the *Ts'an T'ung Ch'i* concatenates with others and illuminates them, until

finally the philosophical background of the doctrine of WEI PO-YANG (魏伯陽) (12567, 9340, 12883) can easily be made out. In the same way, other studies on Chinese alchemy and an acquaintance with other treatises will later give us a better understanding of the evolution and movement of alchemical ideas and will enable us to guess their origin with greater probability.

The translation is based upon the version of YÜ YEN (俞琰) (13567, 13073) who compared the various versions of the *Ts'an T'ung Ch'i* which existed in his time, including that of CHU HSI (朱熹) (2544, 4077) or CHU-FU-TZŬ (朱夫子) (2544, 3612, 12317), prepared a critical compilation of variants entitled *Ts'an T'ung Ch'i Shih I* (參同契釋疑) (11548, 12269, 1053, 9983, 5423) (An Explanation of Doubtful Points of the *Ts'an T'ung Ch'i*), and in 1284 A.D. published a preferred version with a commentary entitled *Ts'an T'ung Ch'i Fa Huei* (參同契發揮) (11548, 12269, 1053, 3376, 5149) (A Dissertation on the *Ts'an T'ung Ch'i*). The commentary of YÜ YEN was found to be of assistance in the preparation of the translation. We have divided the treatise arbitrarily into different chapters from those of YÜ YEN. In the case of certain obscure passages of YÜ YEN's version, where a study of the commentary still left it impossible to make a clear translation, the alternative passage of one or the other of the variants was taken. We have used the text with variants and commentary of YÜ YEN which are printed in Vols. 625-627 of the Collected Taoist Classics, published by The Commercial Press, Ltd., Shanghai, China. Since these writings have for centuries been treasured by the followers of the Taoist religion, it seems reasonable to suppose that they are authentic, or, at least, that they approximate as closely to their originals as do the texts, say, of the Hebrew scriptures.

The translation of the *Ts'an T'ung Ch'i* and of the other material from the Chinese to which reference is made or which is quoted in the Introduction or the Notes is entirely the work of LU-CH'IANG WU (吳魯強) (12748, 7388, 1293). Except for the material from the Chinese, the Introduction and the Notes are the work of TENNEY L. DAVIS. Each of us has read all of the manuscript,

and each has profited by the advice, suggestion, and criticism of the other.

The Introduction is a general survey of our present knowledge of Chinese alchemy. It indicates certain points on which students of the subject are not agreed, and occasionally it offers an interpretation of the evidence. But the present translation of the *Ts'an T'ung Ch'i* is itself also evidence which requires to be interpreted. Some of its indications are pointed out in the Notes, and others will be more apparent when other alchemical texts are available. The Notes are intended particularly for those who may wish to compare Chinese with European alchemy.

We have not been able to make out the processes of WEI PO-YANG or to identify many of the substances which are intended by his fanciful names. His obscurity is no greater than that of the mediaeval alchemists; and it will no doubt be possible in the future to identify the White Tiger and the Gray Dragon as it has been possible to identify the Green Lion and the White Lady of the Latin writers.

When Chinese words are rendered in Roman letters, we have followed the spelling which is used in GILES' Chinese-English Dictionary, 2nd. ed., London, 1912. As this does not fully identify the word, we have printed, at the place of the first occurrence of the word, the Chinese ideograph and the number which corresponds to this ideograph in GILES' Dictionary. Later occurrences of each Chinese word are indicated in the Index. All of the Chinese names, except those of LIANG and WU, are written in the Chinese manner, family name first. The names of LIANG and WU are written in the Occidental manner, family name last.

LU-CHIANG WU,
TENNEY L. DAVIS.

INTRODUCTION

WEI PO-YANG (魏伯陽) (12567, 9340, 12883) has been called the father of Chinese alchemy. His *Ts'an T'ung Ch'i* (參同契) (11548, 12269, 1053) is regarded as the earliest work in the Chinese language which is devoted exclusively to

WEI PO-YANG, his dog, and his disciple, YÜ, all of whom became immortal by taking the medicine. The three-legged incense-burner or furnace in the foreground is evidently the *ting* in which the medicine was prepared.

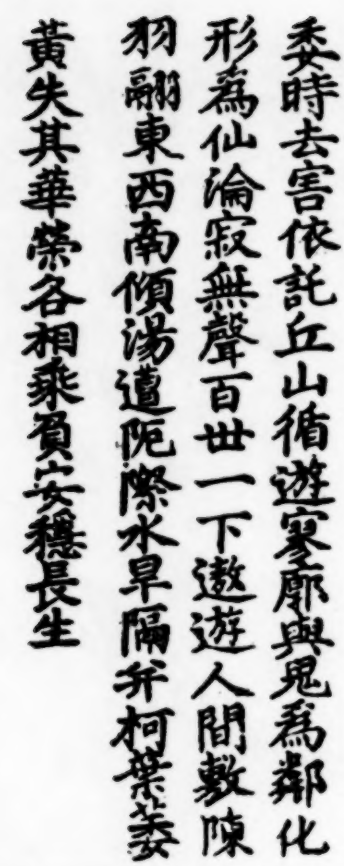
Isis, XVIII, pl. 3. L. C. WU; T. L. DAVIS

LIU AN and one of the *hsien* who taught him the art. The barnyard animals, having eaten the material which remained in the vessels after the preparation of the medicine, also ascended into the clouds.

Isis, XVIII, pl. 4 L. C. WU; T. L. DAVIS

The Yellow Emperor, HUANG-TI, humbly seeks knowledge of the *Tao* in the cave of KUANG-CH'ENG-TZŬ.

Isis, XVIII, pl. 5 L. C. WU; T. L. DAVIS



The Cryptogram of Wei Po-yang.

the subject, but it is by no means the earliest Chinese writing which makes mention of alchemy. It shows that a definite and extended alchemical tradition already existed, and mentions several earlier alchemists concerning whom other information is available either from their own writings or from the historical books.

For three or four centuries before WEI PO-YANG, the Chinese had been engaged in an effort to transmute base metals into gold—not because gold was intrinsically valuable, but because the magical efficacy of artificial gold was such that the eating of food out of vessels made from it would produce longevity—and they were attempting to prepare the elixir of immortality from cinnabar. The similarity of the methods and aims of the Chinese alchemists with those of the later Greek, Arab, and Latin Europeans suggests that all alchemy derives from a single origin. While it has been thought that the appearance of alchemy in China in the second or third century B.C. resulted from the influx of alchemistic teaching from Egypt or from Mesopotamia, or possibly from India, we have no early alchemical documents from the latter places—and the *Ts'an T'ung Ch'i* of WEI PO-YANG appears to be the earliest treatise entirely on alchemy with which we are at present acquainted.

WEI PO-YANG

WEI PO-YANG was a Taoist philosopher and alchemist, a native of *Wu* (吳) (12748) in the present province of *Kiangsu* (江蘇) (1208, 10320). In the year 121 A.D. he was summoned to Court but refused the invitation because he had no liking for officialdom. In the Epilogue of the *Ts'an T'ung Ch'i* he describes himself as "a lowly man from the country of *Kuai* (會) (6333), who has no love for worldly power, glory, fame, or gains, who wastes his days leading a simple, quiet, leisurely, and peaceful life in a retreat in an unfrequented valley."

The *Ts'an T'ung Ch'i* is one of the Taoist Classics and purports to be a commentary on the Book of Change but is really a treatise on the preparation of the pill of immortality. The *Lieh Hsien Ch'üan chuan* (列仙全傳) (7081, 4449, 3176, 2703) (Complete

Biographies of the Immortals) says that WEI PO-YANG " entered the mountains to make efficacious medicines. (With him were three disciples, two of whom he thought were lacking in complete faith. When the medicine was made, he tested them. He said, ' The gold medicine is made but it ought first to be tested on the dog. If no harm comes to the dog, we may then take it ourselves; but if the dog dies of it, we ought not to take it.' (Now PO-YANG had brought a white dog along with him to the mountain. If the number of the treatments of the medicine had not been sufficient or if harmonious compounding had not reached the required standard, it would contain a little poison and would cause temporary death.) PO-YANG fed the medicine to the dog, and the dog died an instantaneous death. Whereupon he said, ' The medicine is not yet done. The dog has died of it. Doesn't this show that the divine light has not been attained? If we take it ourselves, I am afraid we shall go the same way as the dog. What is to be done? ' The disciples asked, ' Would you take it yourself, Sir? ' To this PO-YANG replied, ' I have abandoned the worldly route and forsaken my home to come here. I should be ashamed to return if I could not attain the *hsien* (仙) (4449) (immortal). So, to live without taking the medicine would be just the same as to die of the medicine. I must take it.' With these final words he put the medicine into his mouth and died instantly. On seeing this, one of the disciples said, ' Our teacher was no common person. He took the medicine and died of it. He must have done that with especial intention.' The disciple also took the medicine and died. Then the other two disciples said to one another, ' The purpose of making medicine is to attempt at attaining longevity. Now the taking of this medicine has caused deaths. It would be better not to take the medicine and so be able to live a few decades longer.' They left the mountain together without taking the medicine, intending to get burial supplies for their teacher and their fellow disciple. After the departure of the two disciples, PO-YANG revived. He placed some of the well-concocted medicine in the mouth of the disciple and in the mouth of the dog. In a few moments they both revived. He took the disciple, whose name was YÜ (虞) (13608), and the dog, and went the way of the immortals. By

a wood-cutter whom they met, he sent a letter of thanks to the two disciples. The two disciples were filled with regret when they read the letter." The *Lieh Hsien Ch'üan chuan* further states that WEI PO-YANG wrote two treatises, the *Ts'an T'ung Ch'i* (The Akinness of the Trio) and the *Wu Hsiang Lei* (五相類) (12698, 4249, 6853) (The Akinness of the Five) *(See our Note LXIX)* and adds that " they appear to be expositions of the Book of Change but in reality the diagrams are only disguises for expositions of the making of the medicine."

WYLIE in his *Notes on Chinese Literature* (1) says that the *Ts'an T'ung Ch'i* of WEI PO-YANG is the earliest work now extant which is devoted especially to the subject of alchemy, and adds that " his book and his doctrine have been by common consent discarded by the literati." The literati to whom he refers are the Confucian scholars who generally disregard the Taoist writings anyway. But WYLIE also mentions several commentaries on the *Ts'an T'ung Ch'i*, among them one by CHU HSI (朱熹) (2544, 4077) or CHU-FU-TZŬ (朱夫子) (2544, 3612, 12317) (1130-1200 A.D.) whom he elsewhere in the same book describes as a distinguished Confucian scholar. According to GILES (2) CHU HSI " placed himself first in the first rank of all commentators on the Confucian Canon." In 1241 his tablet was placed in the Confucian temple.

The *Ts'an T'ung Ch'i* makes use of the occult relationships of the magic figures or *kuas* (卦) (6311) of the Book of Change for describing the preparation of the pill of immortality and for showing the akinness of the three, that is, of the alchemical processes, the Book of Change, and the Taoist doctrines, which the author says in the Epilogue are " variations of the same thing under the guise of different names." The author mentions the obscurity of earlier writers and states that he is making an effort to be clear in spite of his feeling of inferiority and inadequacy for the task.

(1) A. WYLIE, *Notes on Chinese Literature : with Introductory Remarks on the Progressive Advancement of the Art ; and a List of Translations from the Chinese into Various European Languages, New Edition*, Shanghai, 1901, p. 219.

(2) HERBERT A. GILES, *A Chinese Biographical Dictionary*, London and Shanghai, 1898. Article *Chu Hsi*.

His descriptions of the processes are about as lucid, or about as obscure, as the descriptions of the mediaeval alchemists. He gives symbolic and imaginative names to many of the substances which are used, and insists upon the necessity for careful and accurate compounding and for a cautious interpretation of the text which, he says, he has intentionally obscured in places. He has a keen sense of humor and a proper appreciation of the value of grotesque illustrations in an argument. He gives really poetic descriptions of the effects of the pill of immortality. One passage illuminates another, and the two throw further light upon a third. The perfection of the imagery and the intricacy of the rhetoric give the treatise an atmosphere similar to that of a piece of old Chinese embroidery.

WU-HSING AND YIN-YANG

Chinese alchemy, like all of Chinese science, is erected upon the fundamental concepts of *Wu-hsing* (五行) (12698, 4624) (the Five Elements) and *Yin-Yang* (陰陽) (13224, 12883) (the Two Contraries). Both are genuine scientific concepts which supply categories for the description of natural things, and both in the writings of the alchemists are involved with magical and fantastic connotations. An examination of their history (3) will throw light on the origins of Chinese alchemy.

The notion of *Wu-hsing*—the quintet : water, fire, wood, gold (or metal), and earth—at first had no magical relationships. One of the earliest cases of its use is in the *Hung Fan* (洪範) (5252, 3429) (Great Plan) chapter (twelfth century B.C.) of the *Shu Ching* (10024, 2122) (Book of Historical Documents). " In the olden days, so I heard, in the time of *Kun* (鯀) (6534), a deluge overran the Kingdom putting *wu-hsing* at nought." LIANG, commenting on this passage, says that it ought to be interpreted as

(3) CH'I-CH'AO LIANG (梁啟超) (7021, 1110, 506), *On the Origin and Evolution of the Doctrines of Yin-Yang and Wu-hsing* (in Chinese), *Eastern Miscellany*, Shanghai, Vol. 20, No. 10, pp. 70-79, 1923.

meaning that on account of the deluge all the things which can be classified by *wu-hsing* (or the five kinds) became unavailable for man's use. The *Hung Fan* chapter says further :

" *Wu-hsing* (the quintet) : first, water; second, fire; third, wood; fourth, gold (or metal); and fifth, earth. Water is that which soaks and descends; fire that which blazes and ascends; wood that which is straight and crooked; gold (or metal) that which obeys and changes; and earth that which is of use for seed-sowing and harvest. That which soaks and descends becomes salt; that which blazes and ascends becomes bitter; that which is crooked and straight becomes sour; that which obeys and changes becomes acrid; and from seed-sowing and harvest come sweetness."

The *wu-hsing* are here plainly the constituent elements of material things. *Tso Ch'iu Ming* (左丘明) (11753, 2310, 7946), a disciple of Confucius, said that " nature provides the *wu-hsing* and the people use them."

GILES (4) reports the genetic relationships which were supposed to exist between the *wu-hsing*, as follows :

Metal	destroys	Wood,
Wood	»	Earth,
Earth	»	Water,
Water	»	Fire,
Fire	»	Metal,
Metal	produces	Water,
Water	»	Wood,
Wood	»	Fire,
Fire	»	Earth,
Earth	»	Metal.

Although the term, *wu-hsing*, at first meant only the five elements, it later took on an occult and magical connotation and was used in connection with the five ways of righteous conduct, the five social relationships, the five virtues, the five tastes, the five colors, the five tones, etc. The earliest and most fantastic and systematic treatment of *wu-hsing* occurs, according to LIANG, in the writings of LÜ PU-WEI (呂不韋) (7520, 9456, 12527) (died 235 B.C.). It was later adopted by TAI SHÊNG (戴聖) (10567, 9892)

(4) HERBERT A. GILES, *A Chinese-English Dictionary*, 2nd. ed., London, 1912. Article *K'o* (剋) (6116).

(second to first century B.C.) and still later by HUAI-NAN-TZŬ (淮南子) (5034, 8128, 12317) (died 122 B.C.). LIANG says :

" The seasons of the year were thus divided among the *wu-hsing :* spring, *wood ;* summer, *fire ;* autumn, *gold ;* winter, *water ;* and, in order to complete the story, they even went so far as to assign the interim between summer and autumn to *earth*. In a similar manner the magic quintet was correlated with the five locations : east, west, north, south, and center; with the five colors : blue, red, yellow, white, and black; with the five tones : *kung*, *shang*, *ko*, *chêng*, and *yü ;* with the five tastes : sour, bitter, salty, astringent, and sweet; with the five animated species : furred, shelled, scaly, feathered, and nude; with the five worships : of wells, of furnaces, of doors, of eaves, and of sacred roadways; with the five grains; with the five domesticated animals : horse, ox, sheep, dog, and hog; with the five internal organs of the body : heart, liver, lungs, spleen, and kidneys; with the five rulers of ancient China : *T'ai-hao*, (太皞) (10573, 3886), *Yen-ti* (炎帝) (13069, 10942), *Huang-ti* (黃帝) (5124, 10942), *Shao-hao* (少昊) (9746, 3887), and *Chuan-hsü* (顓頊) (2714, 4720); and with the five gods : *Chü-mang* (句芒) (2947, 7655), *Chu-jung* (祝融) (2597, 5762), *Hou-t'u* (后土) (4027, 12099), *Ju-shou* (蓐收) (5688, 10009), and *Hsüan-ming* (玄冥) (4790, 7951). Thus the thousand and one entities of the universe have been ruthlessly forced into five categories corresponding to the *wu-hsing*. This fantastic mood has been dominating the mind of the nation for at least two thousand years and more, and has often manifested itself in deeds."

While the notion of *wu-hsing*, in its original meaning of the five elements, remounts to the twelfth century B.C., the scientific notion of *Yin-Yang*, or the two contrary principles, became definite at a later time, probably after CONFUCIUS (551-479 B.C.), and had no noteworthy importance until it appeared in its fantastic and occult connotations.

The word, *yin*, according to LIANG, originally had the meaning of covering the sun with clouds. It came to mean shaded, dim,

beclouded, and, since Chinese cities were generally laid out with the principal entrance on the southern side, it meant the northern or shaded side of the city, also the south side of a river, the interior, the reverse, and the north side of a mountain. The word, *yang*, originally signified "the bright aspect of banners fluttering at sunrise," but it soon acquired the meaning of the brilliancy of the sun, hence sunlight, warmth, the face-side, the exterior, the north side of a river, and the south side of a city or of a mountain. The couplet, *yin-yang*, was used to signify opposites, such as north and south, reverse and obverse, and this was without magical connotation and without the belief that the opposites were scientific categories by which the endless diversity of nature might be understood and classified. The words, *yin* and *yang*, moreover, were used separately more often than they were used together.

LIANG states that the Book of Rites and Ceremonies does not contain either of the words. In the Book of Poetry the word, *yin*, is used eight times, the word, *yang*, fourteen times, and the phrase, *yin-yang*, only once and then in its original meaning of light and shade. The Book of Change uses *yin* only once and *yang* not at all. The commentaries on the Book of Change which are ascribed to CONFUCIUS are devoted to an exposition of that philosopher's dualism. He conceived the universe as embracing two kinds of forces which by interaction gave rise to the diverse facts of nature. The forces were not easy to describe; and he referred to them as *kang-jou* (剛柔) (5895, 5653), hard and soft; *tung-ching* (動靜) (12256, 2179), motion and rest; *hsiao-hsi* (消息) (4297, 4034) ebb and flow; *ch'ü-shên* (屈伸) (3078, 9817), bending and unbending; *wang-lai* (往來) (12500, 6679), going and coming; *chin-t'ui* (進退) (2075, 12183), going forward and backward; *hsi-p'i* (翕闢) (4132, 9026), folding and unfolding; as well as *yin-yang* (陰陽) (13224, 12883); but the latter is much less frequently mentioned than some of the other pairs. In short, *yin* and *yang*, as used by CONFUCIUS, had no magical connotations but did have, along with

other pairs of terms, a certain philosophical and scientific usefulness for the discussion of natural phenomena.

The notion of *Yin-yang* gradually became extended until in the writings of the Taoists and alchemists it appears as a fundamental cosmological concept having innumerable fantastic connotations. It was supposed that the primal matter, *t'ai-chi* (太極) (10573, 859), in its gyrations gradually separated into two parts, the *liang-i* (兩儀) (7010, 5455) or regulating powers which together constituted the soul of the universe. The heavy and gross part, *yin*, settled and formed the earth, while the fine and light part, *yang*, remained suspended and formed the heavens. *Yin* was the female principle, negative, heavy, earthy, and dry, typifying in general the more undesirable aspects of nature such as cold, darkness, weakness, and death. *Yang* was the positive, male principle, desirable, active, fiery, possessive of qualities directly opposed to those of *yin*. From the interaction of these two contraries, all things in the universe were created and controlled in their various manifestations.

Yang was identified with the sun and *yin* with the moon. The interaction of these two produced the five elements—each identified with a planet—which make up the material world. Each element by combination with *yang*, that is, the element endowed with positive qualities, differed from the same element combined with *yin* or endowed with negative qualities. Many of the occult relationships of *yin* and *yang* and of the *wu-hsing* have been tabulated by GILES (5) in part as follows.

Element.	*Combination with Yang.*	*Yin.*	*Corresponding Planet.*
Wood	Fir	Bamboo	Jupiter
Fire	Burning wood	Lamp flame	Mars
Earth	Hill	Plain	Saturn
Metal	Weapon	Kettle	Venus
Water	Wave	Brook	Mercury

The similarity of the Chinese *yin-yang* doctrine to the ideas prevalent in the ancient religions of Babylonia and Egypt raises interesting questions of priority and origins. Osiris and Isis were identified in Egypt with the sun and moon, and together they

(5) GILES, *Chinese-English Dictionary*. Part I, pp. 28-29.

produced all things. The Emerald Table of HERMES TRISMEGISTOS, which is probably the oldest document of western alchemy if it isn't of eastern origin after all, says that "the father of it is the Sun, the mother of it is the Moon." The Sun and Moon of HERMES are the same as the positive Sulfur and negative Mercury principles of ZOSIMOS and JABIR. The Latin GEBER said that sulfur is *pinguedo terrae* (fatness of the earth). BECHER thought that the Sulfur principle ought to be called *terra pinguis* (fat earth), and his disciple, STAHL, preferred to name it *phlogiston*. The doctrine of the two contraries, with only superficial modification, dominated the science of chemistry until the time of LAVOISIER.

Prior to the time of the Feudal Kingdoms (722-481 B.C.) the phrases *ying-yang* and *wu-hsing* were of rare occurrence and possessed only their ordinary meanings. They do not occur together in the writings of CONFUCIUS, LAO-TZŬ (老子) (6783, 12317), MO-TZŬ (墨子) (8022, 12317), MENCIUS (孟子) (7795, 12317), HSÜN-TZŬ (荀子) (4875, 12317), or HAN-FEI-TZŬ (韓非子) (3827, 3459, 12317). LIANG believes that the doctrines of *yin-yang* and *wu-hsing* were first elaborated and spread by the divinationists, astrologers, and magicians of *Yen* (燕) (13048) and *Ch'i* (齊) (1074) (the present provinces of *Shantung* (山東) (9663, 12248), *Honan* (河南) (3936, 8128), and *Hopei* (河北) (3936, 8771), in particular by TSOU YEN (鄒衍) (11811, 13113) (fourth to third century B.C.), TUNG CHUNG-SHU (董仲舒) (12259, 2876, 10045) (second century B.C.), and LIU HSIANG (劉向) (7270, 4283) (80-09 B.C.). Although the writings of TSOU YEN are no longer extant, their purport can be gathered from the references to them in the historical writings of SSŬ-MA CH'IEN (司馬遷) (10250, 7576, 1711) (about 145 to 86 or 74 B.C.). LIANG concludes that TSOU YEN "was the fanatic who started the uncomely and uncouth doctrines." SSŬ-MA T'AN (司馬談) (10250, 7576, 10656) (died 110 B.C.), the father of SSŬ-MA CH'IEN, placed *Yin-Yang*-ism on a par with Confucianism, Taoism, *Mo*-ism, Nominalism, and Legalism, and wrote an essay

on the " Essence of the Six Schools." We infer that by his time the doctrines had been pretty fully elaborated into the form in which they pervade the writings of the alchemists.

MASPERO (6) says that TSOU YEN amalgamated geographical and astronomical ideas from India with the old Chinese tradition, attempted to bring them into accord with the " purely Chinese notions " of *yin-yang* and *wu-hsing*, related the five elements to the five dynasties of ancient China, and taught many other occult associations. But if this is so, it does not necessarily mean that alchemy came to China from India or that the occult relationships between alchemy and *yin-yang* and *wu-hsing* were of Hindu origin. The facts discussed by LIANG, moreover, suggest rather strongly that MASPERO may not be correct in supposing *yin-yang* to be a purely Chinese notion. *Ying-yang* possessed no particular interest until the time of TSOU YEN when it appeared in its occult relationships. At the same time the already scientifically important notion of *wu-hsing* took on fantastic connotations and assumed a greater importance. At the same time alchemy arose in China. The facts suggest that the notion of the two contraries and the occult doctrines associated with that notion came to China from some other civilization, possibly, as suggested above, from Babylonia or Egypt in which places they were flourishing. Possibly alchemy came also at the same time. But the search for the elixir of immortality seems to bear no necessary relation to the occult doctrine of the contraries, and we are unwilling to conclude that the two necessarily derive from the same origin.

THE QUESTION OF THE TAOIST ORIGIN OF CHINESE ALCHEMY

The priority of Chinese alchemy appears to be established. Although the Egyptians and Assyrians had attained great skill in various chemical arts at an early date, in particular in the making of pigments, glass, and enamel, in dyeing, and in metal working, they do not seem to have sought for an elixir of immortality or to have attempted to transmute base metals into noble ones. The Egyptian metal workers were accustomed to alloy base metals

(6) HENRI MASPERO, *La Chine Antique*, Paris, 1927.

in a manner to imitate gold and silver, and probably used the alloys fraudulently, but evidently did not believe that they had accomplished real transmutations. They no more mistook their alloys for the genuine precious metals than we now mistake " Dutch gold " or " German Silver." An echo of this ancient attitude toward artificial metals is heard as late as the thirteenth century, at a time when transmutation was considered a verity, for ALBERTUS MAGNUS says in *de Alchemia* (7) that " the iron of alchemy is not attracted by the magnet and the gold of alchemy does not gladden the heart of man, nor cure leprosy, and a wound festers which is made by means of it, a result which does not occur from natural gold." The Leiden and Stockholm papyri, which date probably from the third century A.D., are sober documents of practical chemistry without suggestion of alchemy. The earliest Alexandrian " alchemists " whose writings are known to us (possibly first century, but certainly no later than third century A.D.) attempted to tincture base metals to the color of gold and silver, and used fantastic and imaginative language closely similar to that of the Chinese alchemists, but did not pursue either of the great objectives by which alchemy is distinguished from ordinary practical chemistry. The notions of the transmutation of the metals and the elixir of immortality probably did not appear in Occidental chemistry until after the Arabs had brought them to Europe.

EDKINS (8) arguing from the similarity of the aims and materials of Chinese with Arabic alchemy, and from the facts of the history of Taoism, has concluded that alchemy arose spontaneously in China as an offshoot from the magical and fantastic side of the Taoist religion and that Chinese alchemy reached the Arabs, and thence Europe, through Persia, with which country the Chinese had intercourse both before and after its conquest by the Mohammedans. MARTIN (9) and more recently JOHNSON (10)

(7) *Theatrum Chemicum*, Ursellis, 1602. Vol. 2, p. 495.

(8) Rev. JOSEPH EDKINS, *Trans. China Branch Roy. Asiatic Soc.*, Hong Kong, 1855, part 5, pp. 83-99.

(9) W. A. P. MARTIN, *The Lore of Cathay or the Intellect of China*, New York, Chicago, and Toronto, 1901. *Chapter* 3, *Alchemy in China, the Source of Chemistry*, pp. 44-71.

(10) OBED S. JOHNSON, *A Study of Chinese Alchemy*, Shanghai, 1928. (*Isis*, 12, 330-32).

have agreed with the conclusion of EDKINS relative to the Taoist origin of Chinese alchemy but have mistakenly insisted upon a fundamental similarity, which does not exist, between Chinese and Alexandrian alchemy. MARTIN believes that Chinese alchemy came to Europe through Alexandria and Byzantium, and JOHNSON that it came through Alexandria.

The question has several aspects. First, the similarity or not of Chinese alchemy to Alexandrian chemistry or to Arabic alchemy; and on this point the present translation of the *Ts'an T'ung Ch'i* supplies valuable evidence. It resembles the writings of the Alexandrian chemists in using fantastic and imaginative language and in using an occult philosophy built up around the idea of the contraries, but differs from them profoundly in its interest in something with which the Alexandrian chemists had nothing to do, namely, the elixir of immortality. Second, the Taoist origins. The facts which EDKINS, MARTIN, and JOHNSON have brought forward make clear the natural affinity which exists between alchemy and Taoism. If they do not prove that Chinese alchemy originated out of Taoism, they at least show abundantly that Taoism supplied a congenial medium for the growth of alchemical ideas. While the points of similarity between the earlier Chinese and the later European alchemy argue for the westward movement of alchemical knowledge, the points of difference are evidence of origins. The central idea of Chinese alchemy, upon which the whole structure of its doctrine depends, did not appear in European alchemy at all. The notion of *hsien* or benevolent supernatural beings, endowed with extraordinary powers, who had attained immortality by chemical means did not perhaps appeal to Occidental minds or harmonize with Occidental religions. European alchemists hoped at most for a long-continued natural existence. The notion probably did not come to China from India, for the writings of SUSRUTA (sixth century, B.C.) and of NAGARJUNA (third century, A.D.) contain no such idea, though they do describe medicines which promote longevity. (11) The notion of *hsien* moreover, appears to have arisen naturally out of a discussion and elaboration of the philosophy of LAO-TZŬ.

(11) Verbal communication from Y. SUBBAROW, M.D., Research Associate at the Harvard Medical School.

The doctrine of LAO-TZŬ was a lofty and abstract mysticism, vaguely expressed, a general metaphysics with ethical implications, a guide of life but one which contrasted sharply with the concrete and practical teaching of CONFUCIUS. The *Tao* (道) (10780) or Way was to be attained by inaction. In its original purity Taoism was a philosophy for meditative thinkers, devoid of the characters which could give it the popular appeal of a religion. It had no mythology, no hell, no heaven beyond the attainment of the *Tao* which required a rigorous self-discipline beyond the power of the majority of men, no idols, no liturgies, no offerings. The spread of Buddhism in China perhaps supplied the hint. Taoism took on magic, fantastic, and superstitious doctrines and practices, and became a religion.

The seekers of the *Tao*, despairing of accomplishing the perfect control of the self, sought physical means of attaining it, by deep breathing, by abstinence, by the use of the medicine of immortality. Those who had attained the *Tao* became *hsien;* having attained complete inaction, they were capable of all or any action however extraordinary — in accordance with the usual dialectic of mysticism. (12)

The Taoist Canon contains many treatises on alchemy and is a veritable treasure-house ready for future students of the subject.

WIEGER's bibliography of Taoism (13) lists 1,464 titles of which

(12) EDKINS says, *loc. cit.*, pp. 91-92, " The characteristics of early Taoism will help to explain why the religionists of this school rapidly deteriorated in their aims and character, and became the victims of gross superstition and transparent imposture.

" The objects they proposed to themselves as the proper work of their religion, and the means they chose to effect them, assumed more and more a physical aspect. They expected to be self-reformed by the adoption of a physical regimen only. Not comprehending the immateriality and immortality of the soul, they hoped it might be purged from its grossness and saved from decay by physical remedies. It was by stillness, solitude, and repression of muscular and intellectual activity, abstinence, a life free from excitement in some wild mountain retreat, that man could elevate himself to dominion over nature, and exemption from degradation and suffering. They looked to nature to provide a cure for the miseries of the world.

" In conformity with these views, many of them became hermits, and others sought for some plant, or mineral, or compound preparation, by which exemption from the approaches of physical corruption might be secured. Then followed the follies of alchemy."

(13) Dr. LEON WIEGER, S. J., *Taoisme*, 2 vols., Ho-kien-fou, 1911, 1913.

132 indicate that the treatises relate to alchemy. Of these 132, twenty-one titles suggest that the treatises deal with the spiritual, moral, metaphysical, physiological, or mystical side of alchemy. Alchemy of spirit and alchemy of matter had the same liaison among the Chinese that they later had among the Europeans.

EARLIER ALCHEMISTS

The *Shih Chi* (史記) (9893, 923) (Historical Memoirs) which was commenced by SSŬ-MA T'AN and completed by his son, SSŬ-MA CH'IEN, who succeeded him as grand astrologer or grand annalist to the Chinese court, deals with the history of China from the earliest times to 122 B.C. and reports several cases of alchemical thought and experimentation, among them the earliest organized attempt in Chinese history to secure the elixir of immortality.

The *Shih Chi* tells of the three supernatural islands in the midst of the Eastern Sea, *P'êng-lai* (蓬萊) (8902, 6679), *Fang-chang* (方丈) (3435, 424), and *Ying-chou* (瀛洲) (13329, 2445), where the immortals lived and the drug could be found which prevented death. The Emperor CH'IN SHIH HUANG TI (秦始皇帝) (2093, 9982, 5124, 10942) (259-210 B.C.), the same who established a new dynasty, built the Great Wall, and introduced the hair-pencil or brush for writing on silk instead of on bamboo tablets, became interested by the report of these islands and by what he heard concerning the elixir of immortality. The magicians, LU SHÊNG (盧生) (7396, 9865) and HSÜ SHIH (徐市) (4748, 9905), influenced him to organize an elaborate naval expedition for the purpose of searching for them. He gave to HSÜ SHIH seeds of the five grains and sent him on the voyage with three thousand young men and women, and laborers for all kinds of work. HSÜ SHIH sailed away and discovered a locality remarkable for its peace and fertility. There he remained and was made king. The Emperor continued to hope for his return and made several pilgrimages to the eastern coast of China, where he was accustomed to promenade on the seashore, in the hope that he might in some

manner obtain the wonder-working drug of the three sacred islands in the midst of the sea—but he never obtained it. He returned to *Sha Ch'iu* (沙丘) (9624, 2310) — and there he died.

Ssŭ-ma Ch'ien also tells of an alchemist, Li Shao-chün (李少君) (6884, 9746, 3269), who flourished at the court of the *Han* Emperor, Wu-ti (漢武帝) (3836, 12744, 10942) (156-87 B.C.). "He constantly affirmed that he was seventy years of age, that he was able to rule over spiritual matters and that he could escape old age. He traveled about in order that reports of his prowess might reach the ears of nobility.... He excelled in showing himself shrewd, and in saying things at the same time astounding and accurate." Through his influence the Emperor became interested in alchemy. Li Shao-chün said, "I know how cinnabar transforms its nature and passes into yellow gold. I can rein the flying dragon and visit the extremities of the earth. I can bestride the hoary crane and soar above the nine degrees of heaven." He gave specific instruction to the Emperor. "If you will make the sacrifice of the furnace, you will be able to transmute cinnabar into gold. When the gold shall have been produced, you may make of it utensils for eating and drinking. Through using them your life will be prolonged, so that you may see the blessed immortals of the islands of *P'eng-lai*, which lie in the midst of the ocean. When you shall have seen them, and shall have made proper sacrifices to high heaven and broad earth—then you will never die." It is further recorded that "it was after this discourse that the Son of Heaven (the Emperor) for the first time performed in person the sacrifices of the furnace.... He occupied himself in experimenting with powdered cinnabar, and all sorts of drugs, in order that he might obtain gold." (14)

Liu An (劉安) (7270, 44) or Huai-nan-tzŭ (淮南子) (5034, 8128, 12317) (died 122 B.C.) was a grandson of the first *Han* Emperor, Kao-ti (漢高帝) (3836, 5927, 10942), and was created Prince of *Huai Nan*. He was an ardent Taoist and alchemist, a searcher after the elixir of immortality and the secret of the transmutation of the metals. He praised the art of proper

(14) Johnson, *op. cit.*, p. 70, footnote, pp. 76-77.

breathing, saying that " he who consumes the atmosphere becomes spiritual and attains extreme old age." He also spoke of the regions of the extreme West " where there are rock cities and gold dwellings, and where human beings and wild animals ' drink the atmosphere ' and do not die." He taught that " gold grows in the earth by a slow process, and is evolved from the immaterial principle underlying the universe, passing from one form to another up to silver and then from silver to gold." (15)

Under the pseudonym of HUAI-NAN-TZŬ he wrote the *Hung Lieh Chieh* (鴻烈解) (5269, 7086, 1515) (Story of the Great Light) which deals with cosmogony and contains considerable alchemy. No other work of LIU AN has survived.

The *Lieh Hsien Ch'üan chuan* (Complete Biographies of the Immortals) tells the following story about LIU AN (pl. 4).

" Once there came eight *hsien* to call on him. The door-keeper jested with them, saying ' The Prince desires the *Tao* for the prevention of illness and the attainment of longevity; he wants profound scholars, and desires strong and brave men who can lift the *ting* (鼎) (11268), who are ready to die torturing deaths, and who can have their own way in the world. Now, Sirs, you are aged. You probably possess neither the art of writing nor the bravery of MENG PÊN (孟賁) (7795, 8843) and HSIA YÜ (夏育) (4227, 13659). None of the three qualities do you possess. We do not dare to report your presence to the Prince.'

" The *hsien* laughed and answered, ' We have heard that the Prince reveres the wise and loves the scholar. He is never tired of their discussion and their compnay. All those who possess talents come to him. The ancients valued the learning of the ' Nine-Nine ' (九九) (2263, 2263). They patronized those who could imitate the crow of a cock or the bark of a dog. They sold the bones of horses to get the famous horse, *Ch'i-chi* (騏驥) (1041, 939). Although our parts are too meager to answer the Prince's requirements, yet we cannot see how our meeting with the Prince will bring about any harm. Why, then, are we

(15) JOHNSON, *op. cit.*, pp. 47, 75, footnote.

held back? If the Prince thinks that only the youthful-looking ones have attained the *Tao* and that the hoary are incapable, we are afraid that that is not the way of getting jade by unravelling rocks or of searching the deep for pearls.'

" Having spoken these words, they were all transformed into fifteen year old youths with black hair and peach-blossom cheeks. At this, the door-keeper was frightened and hastened to report to the Prince.

" When the Prince learned the news, without wasting time to put on his shoes, he hurried forth barefooted to greet the visitors. He conducted them to the ' Platform of Longing for the Immortal ' where they were provided with silk draperies and ivory beds, and with tables of gold and jade, while there was burning of the incense of a hundred ingredients harmoniously compounded. The Prince, wearing the shoes of a disciple and facing north toward the visitors, raised his hands in salutation and said, ' AN is of common parts. From youth I have loved the *Tao Tê* (道 德) (10780, 10845).' At this juncture, the eight visitors all changed back into old men and said, ' We have heard that your Highness loves the *Tao*. So we have come to join your court. But we do not know what your Highness desires.

" ' One of us can cause wind and rain by sitting down, can raise clouds and fog by standing up, can make rivers and lakes by drawing on the ground, and can create mountains by piling of sand.

" ' One of us can crumble heights and fill up the deep, can husband the tiger and the leopard, can catch the dragon and the snake, and can master gods and ghosts.

" ' One of us can separate his form and change his appearance, can cause life by sitting down and death by standing up, can cover a complete army from sight, and can turn broad daylight into darkness.

" ' One of us can ride in space and walk on emptiness, can go into the sea and the deep, can go in and out through any partitions, and can breathe a breath of a thousand miles.

" ' One of us can go into the fire without being scorched, and into water without being wetted, can be stabbed without

being hurt, can be aimed at but never hit by an arrow, and is not cold in freezing water, and does not sweat in summer.

" ' One of us can perform thousands of changes at will. He can bring forth birds and animals, weeds and woods in a moment. He can move mountains, heights, and rivers.

" ' One of us can prevent havocs, reclaim from dangers, dispel evils, and do away with harmful things. He can cause longevity.

" ' One of us can boil mud to get gold, assay lead to get silver, and can treat the eight stones to give pearls. He can ride the dragon and harness the clouds to travel afloat on the Great Clearness.

" ' What does your Highness desire? '

" LIU AN made obeisance to the eight *hsien*. He offered wines and fruits to them with his own hands. The *hsien* were tested one after the other, and were confirmed in their ability. He was then given the Book of the Medicine (丹經) (10618, 2122), the " Thirty-Six," and the mercury recipes. The medicine was made but was not taken.

" Now LIU AN had a son, of the name of CH'IEN (遷) (1711), who loved fencing. One day CH'IEN fenced with an official and was hurt. The latter, fearing punishment, wrote to the Emperor alleging that LIU AN was plotting revolt. The Emperor sent TSUNG CHÊNG (宗正) (11976, 687) to bring LIU AN to justice.

" The eight *hsien* said to LIU AN, ' You must go now. This is a heaven-sent messenger for you to depart. So harbor no doubt.' LIU AN went with them up into the mountain. There they made a great ceremonial offering and buried the gold in the earth. They rose to the sky in broad daylight.

" The stones on which the eight *hsien* and LIU AN had stepped became marked. Even now they are found to have the footprints of men and of horses. Chickens which peck at the *tings* used in preparing the medicine, and dogs which lick them, attain lightness. The chickens will cackle and the dogs will bark in the sky."

參同契

TS'AN T'UNG CH'I

TRANSLATION

Chapter I.

Ch'ien (乾) (1742) and *K'un* (坤) (6540) are the gateways to *I* (易) (5497) (change). They are the parents of the *kuas*. The *K'an* (坎) (5870) and *Li* (離) (6905) *kuas* may be likened in configuration to the four walls of a city, and their working is like that of the hub of a wheel which spins the wheel and holds the axle in place. These four male and female *kuas* function like bellows and reeds [in that their usefulness consists in emptiness].

Chapter II.

The control of the *Tao* (Way) of *Yin* (female, negative) and *Yang* (male, positive) is like the work of a skilled driver, holding the reins and exactly following the track. Staying in the interior [of his vehicle] he controls the exterior. The ordinations bespeak the course of the workings. In a moon (month) there are six fives (of days), and the *ching* (經) 2122) and *wei* (緯) (12535) (weft and warp, longitude and latitude) are employed according to (the time of) the day. Altogether there are sixty (divisions, i.e., thirty days and thirty nights). They have the qualities of *kang* and *jou* (hardness and softness) and they also have interiors and exteriors.

Chapter III.

At dawn *Tun* (屯) (12232) *kua* is at work : at eventide *Meng* (蒙) (7763) *kua* takes up the task. The day and the night each has a *kua* of its own. So use them accordingly. [The complete course runs] from the time of the moonless night to that of the new moon. The course goes on repeating. Activity

or inactivity occurs according to the hour of the day. Spring and summer are inside from the hour of *Tzŭ* (子) (12317) (11 p.m. to 1 a.m.) until the hours of *Ch'ên* (辰) (652) (7 to 9 a.m.) and *Ssŭ* (巳) (10284) (9 to 11 a.m.). Autumn and winter should be applied externally from the hour of *Wu* (午) (12769) (11 a.m. to 1 p.m.) until the hours of *Hsü* (戌) (4735) (7 to 9 p.m.) and *Hai* (亥) (3757) (9 to 11 p.m.). Reward or punishment will come according as it is spring or autumn : darkness will come according as it is cold or hot. There are morals in the *Hsiao-tz'ŭ* (爻辭) (4331, 12402) commentaries on the *kuas*. With the appropriate hour will come delight or anger. When the four seasons are thus answered, the *wu-hsing* (quintet) will work out properly.

Chapter IV.

After the heavens and the earth have provided the proper positions, *I* (Change) operates among them. To have provided the positions is to have placed *yin* and *yang* (female and male, negative and positive) in matching positions. *I* (Change) refers to the *K'an* and *Li kuas*. They embody the qualities of *Ch'ien* and *K'un*. The latter two do not have any fixed positions. They flow about in the *Six Vacua* (六虛) (7276, 4711). They come and go without any regularity : and even so do they fluctuate up and down. Rising and falling all the while, they sometimes hide themselves away or vanish for a short time. They embrace all creation and are the fundamentals of the *Tao* (Way). In order to secure emptiness, many tangible things are made. Vessels are useful for their emptiness. Happenings are inferred from the states of the *K'an* and *Li kuas*.

Chapter V.

Statements are not carelessly made, nor are discussions given without sound reasons. They can be verified by experience and thus prove the power of the Gods. By generalization and by inferences [from the Book of Change] conclusions are reached [the truth of which is] evident from fundamental principles. The

K'an kua and *Wu* (戊) (12792) go with the essence of the moon, the *Li kua* and *Chi* (己) (921) go with the light of the sun. The sun and the moon make up the *I* (Change), matching one another with their respective hardness and softness. [The element of] earth, ruling the four seasons, connects the beginning with the end like a thread. Each of the (four) colors, green (dark green), red, white, and black, occupies a region. They are all directed from the Central Palace, thanks to the work of *Wu* and *Chi*.

Chapter VI.

I (Change) is manifestation. Of all heavenly manifestations none are more evident and striking than the sun and the moon. To know the Gods thoroughly is to know creation-evolution. When *yang* is gone, *yin* will come on to take its place A wheel turns by virtue of the proper ordering of its spokes. The manner in which it turns depends on whether it is going into or out of a place.

Chapter VII.

In (the Book of) Change there are three hundred and eighty-four (elementary) strokes, on the basis of which the sixty-four *kuas* are constructed. Between the last day of one moon (month) and the first day of the next, the *Chên* (震) (642) *kua* comes forth to assume authority. At this time the spirit of the heavens matches that of the earth. The sun and he moon reach out for and hold one another. Masculine *yang* scatters the black spread abroad and feminine *yin* is in charge of the yellow transformation. Contact of the nebulosities establishes the foundation for all things. Efforts are made to keep the roots (innate essences) alive, and the spirit is consolidated so as to form the body. People come out of it, and even worms are born of it.

Chapter VIII.

And then Confucius wrote commentaries on the Great Beginning of Things to the end that the *Tê* (德) (10845) (magnanimity-virtue) of *Ch'ien* and *K'un* should be thoroughly understood. When speaking of the ancient times, we give high mention to the

First Emperor just as we trace the beginning of rhymes to the Book of Poetry. As the coming of age is intrinsically in close relation with marriage, even so does the first year call forth the sprouting of growths.

Chapter IX.

The sages do not lead uneventful lives. They look up above for heavenly signs. They follow the wax and wane of these signs and direct their efforts accordingly.

Chapter X.

The *I* (Change) controls the core of the sky and the *Fu* (復) (3721) *kua* establishes the beginning. The first born son inherits his body from his father and has his beginnings in the mother. Growth and decline occur according to the musical scale. Rise and fall take place according to [the movements of the stars of] the Dipper. It will be bright on the third day [of the moon] when the *Chên kua* receives *Kêng* (庚) (6001) in the west. On the eighth day [of the moon] when the *Tui* (兌) (12170) *kua* receives *Ting* (丁) (11253), the upper bow of the moon is like a stretched string. On the fifteenth day [of the moon] the *Ch'ien* (male, positive) body is formed, when it (the moon) is full and *Chia* (甲) (1167) is in the east. *Ch'an-ch'u* (蟾蜍) (342, 2637) is the sun and *t'u-p'o* (兔魄) (12122, 9420) (the heavier component of the spirit of the rabbit) is the moon. The two do not shine together. The *ch'an-ch'u* looks after the course of the *kuas* and the rabbit breathes out live light. When the end of the course of seven [plus] eight is reached, turning and descent will occur. When sixteen takes its turn at the reins, dawning light will appear at the *Sun* (巽) (10441) *kua* and at *Hsin* (辛) (4564). When the *Kan* (艮) (5972) *kua* is at *Ping* (丙) (9295) and in the south, the lower bow [of the moon lights up and it will be the] twenty-third [day of the moon]. At the *K'un kua* and *I* (乙) (5341) is the thirtieth day [of the moon] when the east will have lost its brightness. The divisions succeed each other and

each successor in its turn gives birth to the dragon (gives rise to greatness).

Chapter XI.

[The ordinals] *Jên* (壬) (5610) and *K'uei* (癸) (6453) match [the ordinals] *Chia* and *I*. The *Ch'ien* and *K'un kuas* include the beginning and ending [of all things]. Seven and eight make fifteen; even so do nine and six. The four numbers together make thirty, at which the manifestations of *I* (Change) are destroyed all of a sudden. This is like the middle of a winter when all vegetation is injured and reduced, when traffic is stopped and the ruler goes into deep retirement. [If work is done] according to the season [there will be] no necessity for verbal communications. The heavenly *Tao* (Way) (the *Tao* of nature) is enormously vast. The *T'ai-hsüan* (太玄) (10573, 4790) (the Extremely Intangible), being formless, silent, and empty, is invisible : it disappears within its walls. Failure will be upon him who divulges the secrets. The four *hsiang* (象) (4287) (manifestations) are dealt with for the enlightenment of the younger generation.

Chapter XII.

The eight *kuas* are distributed among the planets. They never fail to operate properly. The mystical essence is exquisite but difficult to observe. It can be guessed at on the basis of (the heavenly) signs. The (heavenly) signs should be observed carefully so as to ascertain their proper expressions. An indicating device should be set up for the indication of the times and omens. Orders are to be issued according to the proper seasons, and opportunities which are offered according to the operation of the (elementary) strokes of the *kuas* should never be neglected. Look above to observe the signs in the Milky Way, look down to note the lay of the land, and look in between to learn the human heart (mind). The knowledge of these three excellencies should be brought together for a comparative study. Acts should be done according to the changes of the *kuas*, and rest should be taken according to the *Chuan-tz'ŭ* (傳辭) (2724, 12402) commentaries on the *kuas*. Thus *Ch'ien* and *K'un* will hold their

sway, bringing in their trail the reign of order below the skies (in the world).

Chapter XIII.

It is necessary for the chief to be careful, to be circumspect, and to be mindful of details. The distribution of precious things comes within the power of men in controlling positions. The Dipper, being of importance in connection with the *Tao*, has the control of things. As *Hsiao-hsiang* ( ) (4331, 4287) (the states of things as described in the commentaries on the *kuas*) stir within, good and evil arise without. The five *wei* (planets) describe their courses according to the seasons. When the ordinations are not properly followed, untoward happenings occur.

Chapter XIV.

In the general records kept at the *Wên-ch'ang* ( ) (12633, 427) god's court the ministers are held responsible. Every official has his own duty and is held responsible for its proper conduct.

Chapter XV.

The sun contains the essence of the *wu-hsing*. The moon is regulated by the six laws. Five by six makes thirty degrees. When they have been duly traversed, a new beginning is made. To be successful care must be exercised not only at the beginning but also through the course until the end. Should the monarch or his people misbehave, evil will come as portended by the unusual wax and wane of the moon. They will be properly punished and he will be deposed. And then there will probably follow peace and order in accord with the *Tao*.

Chapter XVI.

Attention should be turned to the well-being of the inner self so as to attain the state of perfect calmness and freedom from matter. The primordial substance, shining forth unseen, will illuminate the insides of the body. All the openings must be blocked up so as firmly to protect the *ling-chu* ( ) (7222, 2547) (divine plant). The three lights vanish. The *tzŭ-chu* ( ) (12317, 2549) (small pearl) is carefully looked after.

Although it cannot be seen, yet it is close enough to be easily accessible. The yellow center gradually develops. Moistness and fluidity reach the skin (or surface). A right finish follows a proper start, as shapely twigs spring from an upright tree. It is covered by the One and nobody in the world knows it.

Chapter XVII.

The above *Tê* (上德) (9729, 10845) does nothing and does not look to seek. The below *Tê* works and its use is incessant. When the above is shut, it is said that there is; and when the below is shut, it is said that there is not. The there-is-not-ness is given over to the above, where the godly *Tê* dwells. This two-cavity method is needed by both the there-is-ness and the there-is-not-ness.

Chapter XVIII.

One, knowing the white, should hold firm to the black. For then divine light will come in due course. The white is the essence of gold, and the black is the basis of water. The water is the control of *Tao* and is one in number. At the beginning *yin-yang* is black [earth], and with yellow sprouts *(huang-ya)* (黃芽) (5124, 12804), the master of the five metals and the *Ho-ch'ê* (河車) (3936, 574) (river chariot) of the north. Hence lead is black on the outside but holds gold flower (金華) (2032, 5005) in its bosom, like a man who carries jades but is dressed in rags and puts on an appearance of insanity. Gold is the mother of water and the mother hides herself in her offspring. Water is the offspring of gold and the offspring is hidden in the womb of the mother.

Chapter XIX.

True Man *(Chên-jen)* (眞人) (589, 5624) (the spirit, the Accomplished) is the extreme of excellence. He is and he is not. He resembles a vast pool of water, suddenly sinking and suddenly floating. Advancing, retreating, and dispersing, each guards its own boundaries and regions. When first gathered, it may be classified as white. Treat it, and it turns red. Refine

it to externals and internals, and the white lives inside like a virgin. The squareness, the roundness, the diameter, and the dimensions mix and restrain one another. Having been in existence before the beginning of the heavens and the earth: lordly, lordly, high and revered.

Chapter XX.

On the sides there is the walled inclosure, shaped like a *P'êng-hu* pot ( ) (8902, 4954). Closed on all sides, its interior is made up of intercommunicating labyrinths. The protection is so complete as to turn back all that is devilish and undesirable, and the meandering passages take good care of emergencies. Cessation of thought is desirable and worries are preposterous. The divine *ch'i* ( ) (1064) (air, spirit, ethereal essence) fills the quarters and it cannot be held back. Whoever retains it will prosper, and he who loses it will perish. Its movements and rests are always with men.

Chapter XXI.

[What I am advocating] is not the *Li-Tsang* ( ) (6924, 11601) method by which thought occurs as a result of an introspection. [According to the evil method,] steps are taken in accordance with the movements of the stars and planets, and the ordinations follow the course of the sun. But the *Tao* of *Yin* disapproves of [this method of] nine one. As a result disaster will come to the black mass. Gases from food consumed will make noises inside the intestines and stomach. The right essence will be exhaled and the evil inhaled. Days and nights will be passed without sleep, moon after moon. The body will then be tired out, giving rise to an appearance of insanity. The hundred pulses will stir and boil so violently as to drive away peace of mind and body. A temple is erected, and diligent vigil and pious offerings are made mornings and nights at the altar. Ghostly things will make their appearance [to the operator], at which he will marvel even in his sleep. He is then led to rejoice, thinking that he is assured of longevity. But all of a sudden he is seized by an untimely death and his remains are exposed to decay. A slight error has thus led to a grave disaster.

Chapter XXII.

Descriptions of processes are many and varied, numbering upward of ten thousand. [Most of them] violate [the doctrines laid down by] *Huang-Lao* (黃老) (5124, 6783), and being awkward are also out of accord with *Chiu-tu* (九都) (2263, 12050).

Chapter XXIII.

Wise men, understanding this principle, know clearly what course to follow. They practise with diligence day and night. Having eaten [the medicine] for three years, a man attains buoyancy of movement and is able to travel great distances. Stepping over a fire, he is not scorched; dipped into water, he does not get wet. He is able to appear and to disappear [at will]. He will be happy forever. Having achieved the *Tao Tê*, he hides himself to await his time. In time, *T'ai-i* (太乙) (10573, 5341) (the Supreme One) will give the order for him to remove his residence to *Chung-chou* (中州) (2875, 2445) (Central Isle). Thence, upon fulfilment of the required deeds, he will be raised on high and duly ordained.

Chapter XXIV.

In order that the Treatise on Fire shall not have been in vain, I shall explain here in simple language. Like the moon lying on its back is the shape of the furnace and the pot. In it is heated the White Tiger. *Hung-jih* (汞日) (5266, 5642) (mercury sun) is the flowing pearl and with it is *ch'ing-lung* (青龍) (2184, 7479) (Blue Dragon). The east and the west merge together and so the *hun* and *p'o* (魂魄) (5244, 9420) control one another. The upper bow corresponds to the number eight, and so does the lower bow. The *ching* (精) (2133) (essence) of the two bows combine to form the body of *Ch'ien* and *K'un*. Twice eight *liangs* (兩) (7010) (ounces) make a *chin* (斤) (2019) (pound). [Even so do the two eights of the upper and lower bows of the moon put] the *Tao* of *I* (Way of Change) aright and unfailing.

Chapter XXV.

When gold is placed in a hot fire it is not deprived of the brilliancy of its color. Since the days of the unfolding of the universe (creation), the sun and the moon have not diminished in brightness nor has gold lost any weight. The shapes of the sun and of the moon have always been the same. Gold is born under the influence of the moon. At daybreak, receiving magic force from the sun, it returns to its mother. Being enveloped by the sun at the wane of the moon, it hides within the walls and abandons itself to inanity. Thus does the gold regain its original nature. Only when intense brightness is obtained is the *ting* (鼎) (furnace-pot) well heated.

Chapter XXVI.

[The ordinals] *Tzŭ* and *Wu* (午) amount to three, and [the ordinals] *Wu* (戊) and *Chi* are called five. The three and five having been harmonized, the eight stones bring about proper order. They desire one another's presence in their inhalation and exhalation, and they long to be man and wife. Yellow earth (黃土) (5124, 12099) is the father of gold and flowing pearl (流珠) (7248, 2549) (mercury?) the mother of water. Earth is the *kuei* (鬼) (6430) (ghost) of water, and it is not able to arise because of the over-bearing of the earth. The *chu-ch'iao* (朱雀) (2544, 1387) (Red Bird) is the spirit of fire and dispenses victory or defeat with justice. With the ascendance of water comes the vanquishing of fire. Dying together they return to Mother Earth. The three natures merge together and thus show their common origin.

Chapter XXVII.

Longevity is of primary importance in the great triumph. *Huan-tan* (還丹) (5047, 10618) (Returned Medicine) is edible. Gold is non-corruptible in its nature and is therefore the most valuable of things. The *shu-shih* (術士) (10053, 9992) (men of the art) feeding on it attain longevity. Earth, travelling in all seasons, delineates boundaries and formulates rules to be

observed. The *chin-sha* (金砂) (2032, 9620) (gold dust), having entered the five internal organs, spreads foggily like winddriven rain. Vaporizing and permeating it reaches the four limbs. Thereupon the complexion becomes rejuvenated, hoary hair regains its blackness, and new teeth grow where fallen ones used to be. If an old man, he will once more become a youth; if an old woman, she will regain her maidenhood. Such transformations make one immune from wordly miseries, and one who is so transformed is called by the name of *chên-jên* (true man).

Chapter XXVIII.

Hu-fên powder (砌粉) (4930, 3519), on being placed in the fire, becomes discolored and changes back into lead. On treatment with hot liquids ice and snow dissolve into *t'ai-hsüan* (the extremely intangible). Gold is chiefly made up of sand and derives other properties from mercury. The transformations occur because of the essential nature of the materials. Causes and effects are traceable in the course of the changes. The way to make oneself a *fu-shih-hsien* (服食仙) (3727, 9971, 4449) (a drug-using supernatural being) lies in the use of drugs of a nature similar to oneself. For rice seeds are used in the raising of rice, and chickens are hatched from hen's eggs. Things found in nature, when given proper help according to their kind, will result in things easy to improve. Fish eyes cannot replace pearls, and tall weeds cannot be used for timber. Things of similar nature go together : queer things cannot be realized. This explains why the swallow does not give birth to peacocks, and the fox and the rabbit do not mother horses. This also explains why flowing water does not heat up what is above it, and why moving fire does not wet what is under it.

Chapter XXIX.

Many are the learned scholars, but they are too profound to be understood and are therefore lost to the world. They never meet with good fortune : their belongings are devoured by devastating fire. They follow the printed word and sometimes they follow their blind inclinations. The start they make is improper and subsequent regulation is wanting. *Chiang-shih-tan*

(慈石 磁) (1233, 9964, 10629) (a kind of stone), *yün-mu* (雲母) (13812, 8067) (" cloud-mother, " mica), and alum (礬磩) (13527, 12407) are crushed together and cured. Sulfur is burned with elm wood. Mud and mercury are treated in a mixture. These form the support and pivot of the five stone coppers under the drum. Things of different nature and kind are unwilling to unite and live together. Ten thousand failures will come from a thousand attempts. Doubts will fill the heart in middle age. The right course has been abandoned to follow the mistaken path, and the view is too narrow for proper judgement of the future.

Chapter XXX.

Emperor *Fu-hsi* (伏羲) (3691, 4092) (a legendary ruler of ancient China) was most sagacious. He drew the *Eight Kuas* (eight diagrams) after the designs of the sky and the earth. *Wên-wang* (文王) (12633, 12493), the leader of rulers, elaborated the *kuas* by writing the *Hsiao-tz'ŭ*. Confucius, the greatest of all sages of common blood, supplemented the works with the *Shih-i* (十翼) (9959, 5507). These three sages received support from heaven. As they rose and fell, the reigns changed accordingly. Good and evil have their proper place : merits are accorded in proper measure. Work should be executed according to precedence. Inferences should be made with care and measure. It is easy to infer on the basis of the obvious, but it is difficult to infer without any tangible clue. One should expect his son to be looked up to as a model by the world and to edit this book for it. One should be able to be inspired by one's teacher so as to know what has not been known before. For then the light will come to him just as it comes, on unveiling, to a person previously shrouded under a curtain. He will then have gotten onto a high platform with eyes wide open, so to speak.

Chapter XXXI.

The *Huo Chi* (火記) (5326, 923) (Treatise on Fire) comprises six hundred chapters which treat of the same subject. They are so cautiously worded that they are not easily understood by

people of the world. When things are traced back to their origin it will be found that the bright and the dark (the obvious and the obscure) are in close union. A profound subject like this is fit to be treated only by the wise. It is presumptuous therefore for me to write on it. But I cannot hold my peace either; for it would be a great sin on my part not to transmit the *Tao* (Way) which would otherwise be lost to the world forever. I shall not write on silk lest the divine secret be unwittingly spread abroad. In hesitation I sigh. Without cessation I ponder. There are directions for the processes, the more important principles of which shall be set forth but the details shall not be divulged.

Chapter XXXII.

Gold should be used for the embankments so that the water can enter to have its proper play. The number of gold is fifteen : so is that of water. Measurements should be made when the process is about to begin. The water used should be more than one half [of the mixture]. The two things will be made into an essence. The gold will be as heavy as ever. The [element of] earth will not enter, but the other two [elements] will be with it. The three things will enter into each other, undergoing marvellous changes. The *t'ai-yang ch'i* (太陽氣) (10573, 12883, 1064) (the most positive ether) which is underneath gives rise to distillation instantly. Liquefaction takes place first, followed by solidification. This is known as *huang-yü* (黃輿) (5124, 13533) (yellow carriage). As the month and the year draw to a close, the good natures of things are destroyed, resulting in the shortening of life. A bodily transformation takes place into a fine dust which resembles that deposited on a well-lighted window-sill.

Chapter XXXIII.

Treatment and mixing will bring about combination and rapid entrance to the scarlet portal. The escape must be firmly blocked. Below plays the dazzling flame, while the Dragon and Tiger keep up a sustained vociferation. The flame at the start should be weak, so as to be controllable, and should be made strong at the end. Close attention and careful watch should be given

so as to regulate properly the heat and cold. There are twelve divisions to the cycle. On the completion of the cycle a closer watch should be accorded. As the breath expires, life is ended. Death expels the spirit. The color changes into a purple. Behold! the *huan-tan* (Returned Medicine) is obtained. This is then made into pills. These are extremely efficacious, although their individual size is so small that they occupy only the point of a knife or the edge of a spatula.

Chapter XXXIV.

The application of the *wu-hsing* is comparatively simple. Confront fire with water and the brilliance will be extinguished. The interaction of the sun and the moon constantly changes the shape of the moon. When water flourishes, *K'an kua* will attack *Yang;* and when fire is weak at *Li kua,* the day will be dark. *Yin* and *yang* drink and devour one another. This is natural interaction.

Chapter XXXV.

The *ming* (名) (7940) (formal name) is given to signify one's temperament and the tzŭ (字) (12324) (informal name) to denote one's nature. *Huan-tan* (Returned Medicine) is obtained only when gold has returned to its original own. I do not dare say things without ground. My words are modelled after the sayings of the sages. The Ancient Treatise [on Fire] (古文) (6188, 923) takes note of the Dragon and the Tiger; Emperor *Huang-ti* praises the gold flower (金華); *Huai-nan-tzŭ* assays the *ch'iu-shih* (秋石) (2302, 9964) (autumn stone); and *Wang-yang* (王陽) (12493, 12883) eulogizes the *huang-ya* (yellow sprout). The wise ones will follow the discipline strictly [and will therefore achieve success]. The unworthy ones cannot aspire to this. The *Tao* (Way) has always been one since ancient times. One's projects are to be divulged only on personal interview. The student should be industrious and thoughtful. Important things have been plainly set forth in the foregoing. They are unmistakably clear.

Chapter XXXVI.

Hard *Ch'ien* and soft *K'un* match and contain one another. *Yang* donates and *yin* receives. The male and the female need one another. It is this need that brings about creation-procreation, so that the essential *ch'i* (ethereal essence) may have its proper play. The *kuas* of *K'an* and *Li* lead the *Tao* (Way) with their lasting lights shining afar. Its mysteriousness renders it difficult to surmise and impossible to picture. The sage uses his own judgement to arrive at the essentials. The four [*kuas*?], being mingled, enter a state of nothingness. All the other sixty *kuas* spread out to form a carriage. When the dragon and horse are under harness, the process will proceed like the rule of an enlightened monarch. If in harmony,. things will fall out in the proper order. The way will be smooth with no undesirable bypaths. But, beware of bypaths ! They are dangerous. They often cause disasters to a country.

Chapter XXXVII.

The good words of a *chün-tzŭ* (3269, 12317) (Ideal Man) living in seclusion have their effect even at places thousands of miles away. A monarch of ten thousand chariots living in a palace surrounded by nine layers of walls issues orders according to the season with respect to *yin* and *yang*. The apparatus should not be used except at the proper time according to the *kuas*. The ordinals corresponding to the *Tun kua* are *Tzŭ* and *Shên*, and those corresponding to the *Meng kua* are *Yin* and *Hsü*. Each of the sixty *kuas* has its own corresponding days. The two just dealt with will serve as illustrations. The others will not be treated here at length.

Chapter XXXVIII.

Punishment is meted out for the sake of righteousness. *Tê* (magnanimity-virtue) is accorded to the kindly. The laws and instructions should be followed with a most pious heart, with single-mindedness, and with a silent tongue. Wait carefully for the advent of the proper days and hours, and also observe the wax and wane of nature. A slight departure from the right path will cause an irremediable regret. The occurence of the solstices

will be untimely, bringing about untoward events. Winter will be hot and snow will fall in the summer. The two equinoctial days will be out of their proper places and will not answer to the call of time. Wind and rainfall will come in excess. Flood and famine will occur one after the other. Grasshoppers will thrive in the fields like a boiling liquid. Mountains will crumble and the earth will cleave asunder. The heavens will bring forth their hosts of ugliness, and other strange things will also come to pass. The deeds of the pious son will move the heart of the *Huang-chi* (皇極) (5106, 859) (Ruler-Supreme). A word from him will make its effect felt even in places far away. It may bring about calamity, or it may bring about blessings. It may foster peace or it may precipitate war. All these four things may be brought about by the heart and the head.

Chapter XXXIX.

Movement and rest should take place at the proper time as prescribed. Act according to the four seasons so as to suit the *ch'i* (ethereal essence) properly. According to *kang* or *jou* (hard or soft) so do one thing or another, but do not interchange. Each of the *wu-hsing* (Five Elements) has its proper domain and does not change its boundaries without good cause. *I* (Change) goes on in cycles like bending and stretching or obversing and reversing.

Chapter XL.

Act moderately at the transition between two successive moons. Even when it is yet in a confused state, the male and the female pair together. The moist nourishing fluid flows about and acts. The sky and the earth are miraculous beyond imagination. Advantage is taken of this state of affairs to effect concealment.

Chapter XLI.

The start is made in the northeast, the native land of the constellations *Chi* and *To* (箕斗) (855, 11427). Thence a turning toward the right is effected to show forth the disc and its shafts of light. Out of the obscure abyss comes this manifestation of scattering of the exquisite rays. The ascent of the constellations *Mao* and *Pi* (昴畢) (7694, 8994) is evidenced by the *Chên*

kua, when the *yang ch'i* (陽氣) (12883, 1064) (positive ether) begins to be active to bring about the quickening of nature. Nine-one, during this time the Dragon is in hiding.

Yang (Positiveness) is founded on Three and *yin* (Negativeness) prospers on Eight. Hence the *Chên kua* stirs on the third day [of the moon] and the *Tui kua* holds sway on the eighth. Nine-two, the Dragon makes its appearance, when it becomes magnificently calm and peaceful.

On the fifteenth day *Tê* (magnanimity-virtue) is achieved, whereupon the *Ch'ien* (positive) substance is formed. Nine-three, watchfulness is in order, for the working of the divine powers is on the wane.

Growth and decay gradually come and go; and finally a return to the beginning is made. Now the *Sun kua* succeeds to the rule, to consolidate and to control. Nine-four, the Dragon may stir and dangers are on all sides of the way.

The *Kên kua* dictates advance and retreat. Action should be taken promptly according to the order. A careful watch should be made on the twenty-third day of the moon. Nine-five, the Dragon is flying : more felicities attend the heavenly position.

On the thirtieth day of the moon the *K'un kua* gets into power to end the whole affair. As the mother of the kind, it brings up the offspring under shelter. Up-nine, the Dragon at the height of its power is fighting abroad with *Tê* (magnanimity-virtue).

The exquisite nine workings are the regulating forces of the *Tao* (Way). When the *yang* (positive) numbers are finished, a new beginning is made. The temperaments and natures [of the substances] should be properly adjusted to suit [the numbers]. Following the crescents of the moon, round and round, crisscross, and up and down, the six *hsiao* (爻) (4331) flow about in a manner difficult to observe. This constant shifting is the foundation of *I* (Change).

Chapter XLII.

At the first double-hour of the day, which corresponds to the *Fu kua*, the *yang ch'i* (positive ether) begins to operate and at once appears to be slightly strong. At this time when the

Huang-chung (黃鐘) (5124, 2893) coincides with the ordinal *Tzŭ*, a promising beginning flourishes forth. Let there be lukewarmness and all will be well.

When the furnace is worked with sticks, room is made for the propagation of light. With the increase in brilliance the day becomes longer. This corresponds to the ordinal *Ch'ou* (丑)(2518) and to the *Ta-lü* (大呂) (10470, 7520). Appropriateness is now realized.

Face upward to attain the *T'ai* (泰) (10594) (greatness). *Kang* and *jou* (hardness and softness) both come to have sway. *Yin* and *yang* (negativeness and positiveness) are in contact with one another. Undesirable things give place to desirable ones. Activity centers at this, the ordinal of *Yin*, when fortune is at its high tide.

Gradually the rule of the *kua* of *Ta-chuang* (大壯) (10470, 2757) (great brave) is passed. This corresponds to the *Chia-chung* (夾鐘) (1132, 2893) and the ordinal *Mao* (卯) (7693). The elm seeds fall, returning to their origin. Just as punishment and forgiveness are opposite to one another, even so is the day distinguished from the night.

At the *Kuai* (夬) (6327) *kua* when the *yin* (negativeness) beats its retreat, the *yang* (positiveness) rises forth, washing its feathers to rid them of accumulated dust.

The strong light of the powerful *Ch'ien* (male, positiveness) covers the neighborhood on all sides. The rule of *yang* (positiveness) comes to an end at the ordinal *Ssŭ*, which occupies a central position with good connections.

A new period begins with the *Kou* (姤) (6164) *kua*. As this is the transition to coldness, it should be faced with perfect calmness. It is now the ordinal *Wu*, corresponding to the *Sui-pin* (蕤賓) (10401, 9233). *Yin* (negativeness) has come to be the mistress.

When the *Tun* (遯) (12225) *kua* is here, retirement is in order. With the retirement the unusual powers go into hiding, waiting to reappear at the propitious time.

The *P'i* (否) (9073) *kua* brings with it an unpropitious time, when *yin* (negativeness) gathers power at the expense of *yang* (positiveness) and vegetation grows no more.

At the *Kuan* (觀) (6363) *kua* the powers and capacities of things are observed. In mid-autumn different things happen to the plants. Some plants ripen their flowers into fruits and seeds so as to enable the aged and decaying to flourish anew. Wheat and the shepherd's purse bud forth to thrive.

And then comes the *Po* (剝) (9353) *kua*. The body is torn to pieces so that the form is no more. For, as the *ch'i* (ethereal essence) of transformation is exhausted, the divinest is lost.

When the limit of the *Tao* (Way) is reached, a return to the primordial *K'un* (negativeness) is made. The lay of the land should always be given due consideration and the sky should be obeyed. The mystically obscure and distantly indistinct are separate yet related. To propagate according to the proper measures is the foundation of *yin* and *yang* (negativeness and positiveness). Everything is obscure and unknowable. Although at a loss at first, it finally becomes the ruler.

Without the valley there would be no hill. That is in the nature of the *Tao* (Way). Similarly there exists a contrast between rise and fall, and between growth and degeneration. The *K'un kua* marks the end and the *Fu kua* marks the beginning : liks a cycle they go. Throughout and forever the monarch lives to rule.

Chapter XLIII.

[Much thought is necessary for] the cultivation of one's nature and the attainment of longevity. A knowledge of precursory things is necessary for a knowledge of final things. One's body is originally formless. The prime essence spreads throughout, and with the proper *ch'i* (ethereal essence) makes a beginning. In the beginning [the body] resembles a hen's egg and is colored white and black. It measures one inch in width and one in length. Limbs and bowels and bones are then added. After ten moons time it comes out of the womb. Its bones are weak and flexible, and its flesh is as slippery as *I* (飴) (5411) (soft candy).

Chapter XLIV.

Yin and *yang* are the regulating forces of the dwelling of ***hun*** and *p'o* ( ) (5244, 9420) (the lighter and heavier components of man's spirit). The ***hun*** of the sun is *yang* and the *p'o* of the moon is *Yin*. The ***hun*** and the *p'o* live in one another.

Chapter XLV.

Hsing ( ) (4600) (Innate Nature), which takes care of inside affairs, establishes the roots and looks after the growth. *Ch'ing* ( ) (2187) (Temperament), which takes care of outside affairs, builds fences and walls. Only when the city walls are well made, will the people who live within be in safety. When such a time comes, *Ch'ien* (positiveness, male) and *K'un* (negativeness, female) unite in the temperament. *Ch'ien* moves and is erect. The *ch'i* (ethereal essence) surges in him and the *ching* (essence) spreads flowingly. *K'un* (negativeness, female) is quiet and closed to form the home for the *Tao* (Way).

Having given, *kang* (the hard principle) retires. *Jou* (the soft principle) procreates to multiply. There are nine restorations and seven returns, eight home-goings and six stayings-on. White is male and red female. Gold and fire control one another. The estimation and adjustment of water and fire are the foundation of *wu-hsing*. The best attainable substance is like water, clear and flawless. The form of the *Tao* (Way) is the *True Unity* ( ) (589, 5342), which is difficult to represent. It changes and scatters into separate units, each of which dwells by itself.

Chapter XLVI.

Were it not for the sun, no success would attend the use of the sun-mirror to obtain fire. Were it not for the moon and the stars, the shelled creature, *fang-chu* ( ) (3435, 2571), would not have gotten its fluid. The two *ch'i* (ethereal essences) are far away and yet their influences work through great distances. Hence, what more may not be expected of things as close to oneself as the heart and the bosom? The sun is *yang* (positive) and the moon is *yin* (negative), which fact is evidenced by their respective production of fire and water.

Chapter XLVII.

The ear, the eye, and the mouth constitute the three precious things. They should be closed to stop communication. The True Man (the Spirit, the Accomplished) living in a deep abyss, floats about the center of the round vessel. It is being observed in a roundabout way, and its opening and closing are properly coördinated. These are one's controls, the working of which is inexhaustibly versatile.

The *ch'i* (ethereal essence) of *Li* gives nourishment from the inside. When one is empty, there is no need for a keen sense of hearing. When understanding minds meet, there is no necessity for oral exchange of thought—and the fewer the spoken words, the surer and greater the success. When the three of them (the eye, the ear, and the mouth) are properly blocked, the body is relaxed to live in the empty confines.

The mind is relegated to the realm of Nonexistence so as to acquire an enduring state of thoughtlessness. When the mind is integral, it will not go astray. In it's sleep, it will be in God's embrace, but during its waking hours it is anxious about the continuation or termination of its existence.

Gradually the complexion gains in mellowness and the bones gain in strength. After the various *yin* (negative, undesirable) spirits are dispelled, the righteous *yang* (positive, desirable) will then be installed in its proper place.

Persistent application and practice will bring about the flow of the various *ch'i* (ethereal essences). These are like spring showers in abundance and like ice in fluidity. From head to foot they will flow, and thence they will rise once again.

The contraries prove the *Tao* (Way). The weak are what morals are primarily concerned with. It is only when the accumulated dirt is cleaned off that the delicate points can be brought out in their proper setting. Disorder makes the way for orderliness. Light will come after a long period of darkness.

Chapter XLVIII.

People like trivial doings. They do not understand the long and short of the *Tao* (Way). Abandoning the right road and following vicious bypaths in the hope of pursuing a short cut, they finally find themselves at the closed end of a blind alley.

This is like the blind man who goes about without the help of a staff and the deaf man who goes to listen to music. One might as well look for rabbits and birds under water, or try to get fish and dragons in a mountain. One might as well plant wheat to reap barley, or use a pair of compasses to draw a square. Energy is thus wasted and the spirit worn away for long years without success. However, it is a simple matter to learn the method of using internal medicine.

Chapter XLIX.

The *t'ai-yang* (太陽) (10573, 12883) (extreme positiveness, the sun) oftentimes causes the flowing of pearls (珠玉) (2549). People succeed in getting them despite their tendency to escape. The Gold Flower turns in action and changes into a white liquid. Presently it congeals to a hard body. Gold Flower takes priority in the act. In a few moments the solid body melts into a fluid. *Yang* (positiveness) will come to join it when it has assumed the appearance of a disorderly arrangement of horse-teeth, and the nature of things is working in harmony. Any undesirable interference will bring about the quality of *yin* (negativeness).

Chapter L.

The loving mother desiring support receives affectionate attention from her pious sons. The strict father looks after the education of his offspring. The *Wu-hsing* (Five Elements) assume the reign in turn. Interdependently they exist. Fire works gold (metal). Wood thrives at the destruction of gold (metal). These three of the *wu-hsing* unite to form the essence of the heaven and the earth. Ideas about them can be transmitted orally, but it is difficult to put them down in writing.

Chapter LI.

At the double-hour of *Tzŭ* (11 p.m. to 1 a.m.) a left turn take place. At the double-hour of *Wu* (11 a.m. to 1 p.m.) an easterly turn occurs. The double-hours of *Mao* and *Yu* (卯酉) (13398) (5 to 7 a.m. and 5 to 7 p.m.) distinguish the two terms, host and guest.

The Dragon breathes into the Tiger and the Tiger receives

the spirit from the Dragon. They mutually inspire and benefit. They eat and devour one another.

Mars guards the west, Venus crosses the sky. Wherever the devastating forces strike, nothing will stand unscathed. The cat catches the mouse, and birds are afraid of the hawk. As each thing has its own unique power over some other thing, there is no occasion for any boasting.

Chapter LII.

It is difficult to pretend to a knowledge of things which one does not understand. One may spend so much of what he has as to bring want and hunger home to his wife and children, and yet he will be unable to arrive at the truth. Many have there been who have thus devoted themselves to the cause, but very few of them have met with the good fortune of success. By searching far and wide for reputed medicines, they fell into bypaths which are incompatible with the *Tao* (Way). One should make inferences from clues and signs just as he would from the appearance of strangers he meets. The thing to do is to compare things by classes and to trace their beginnings and ends.

Chapter LIII.

The interaction of the *Wu-hsing* (Five Elements) makes them in turn fathers and mothers. The mother possesses the nourishing fluids and the father functions as the fertilizer. Having condensed essences and flowing forms, stones and minerals never decay. Only he who concentrates his efforts with a single-mindedness will be able to attain the *Tao* (Way).

Chapter LIV.

Stand a pole in the sun and a shadow will appear. Call out in a valley and an echo will come. What sure results!

Stuff the throat with a one inch length of wild *ko* (葛) (6669) (a tuber) and an ounce of *pa-tou* (巴豆) (8510, 11412) beans. Lie flat and stir not. Under these conditions, not even the magical manipulations done according to the *Chou* (周) (2450) writings or the writings of Confucius, not the surgical art of

Pien Ch'iao (扁鵲) (9172, 1388), nor yet the loud drum beats of *Wu Hsien* (巫咸) (12735, 4498) will be able to revive you and make you run at high speed.

Chapter LV.

The virgin on the river (河上娥女) (3936, 9729, 220, 8419) is most divine and godly. With the help of fire she flies up, without even showing the trail of her path. At this the ghosts and the dragon fly to their hiding places and can not be found. *Huang-ya* (yellow sprout) is the root of her control (or making).

Chapter LVI.

Be a thing *yin* (negative, female) or *yang* (positive, male), it will get into trouble whenever it goes contrary to the heaven. Why is it that sometimes a fat fowl hatches out only an imperfect chick? Because the match has not been well made, the three out of the five elements have not functioned properly, and the hard and soft principles have shifted from their proper course.

The working of the *Tao* (Way) is natural to the heaven and the earth. It is natural for moving heat to warm up what is above it and for flowing water to wet what is under it. They do these things without being taught. It has been so from the very beginning of things and it can not be changed. Note that when the male and the female cross, the hard and the soft principles are inextricably intertwined. The thing is simply harmonious. No skill is involved in the act.

Man is born to lie flat on his belly and woman on her back. These modes of behavior are derived from the very beginning of their existence in the womb. They behave so not only during their lifetime, but also after their death. They have not been taught by their parents to do so. The origin of it all is traceable to the sexual act.

Chapter LVII.

Of the *K'an kua* and masculine is the moon. Of the *Li kua* and feminine is the sun. The sun shows *Tê* (magnanimity-virtue) and the moon gives forth light. The sun and the moon

undergo changes without incurring any injury. As the *yang* (positive, male) loses its *ch'i* (ethereal essence), the *yin* (negative, female) is deprived of its brightness. In the eclipses the *yin* and the *yang* cover and contain one another. They mutually give and take in order to thrive. The male and the female mix. Each feels the necessity for the other.

Chapter LVIII.

Gold (metal) changes into water. The nature of water is quick. Fire changes into earth, and water is thereby stopped on its course. The active male acts outwards, and the inert female takes things in for keeping. Whenever the male goes into excesses, the female is there to restrain him. The *p'o* (the heavier component of the spirit) is there to control the *hun* (the lighter component of the spirit), checking it from excesses. Not too cold nor too warm, they go forward at the right time. They both have their needs properly met, and they produce evidence that this has happened.

Chapter LIX.

Tan-sha (丹砂) (10618, 9620) (Red Sand, cinnabar, mercury sulfide) is of wood and will combine with gold (metal). Gold (metal) and water live together: wood and fire keep one another company. [In the beginning] these four were in a confused state. They came to be classified as Tigers and Dragons. The numbers for the Dragons, which are *yang* (positive, male), are odd, and those for the Tigers, which are *yin* (negative, female,) are even.

The blue liver is the father and the white lungs is the mother. The red heart is the daughter, the yellow spleen is the grandfather, and the black kidneys are the son. The son is the beginning of the *wu-hsing* (the Five Elements). The *three* things are of the same family and they all are of the ordinal numbers *Wu* and *Chi*.

Chapter LX.

Kang and *jou* (the Hard and Soft Principles) rise to power by turns. As their periods of watch succeed one another, so

their regions of control change also. The Dragon occupies the east and the Tiger the west. They are of the ordinals of *Mao* and *Yu*. Penalty (misfortune) and magnanimity-virtue (benevolence) meet one another with cheer. Penalty (misfortune) destroys and subordinates; magnanimity-virtue (benevolence) gives life and development.

In the second moon (month), when the *K'uei* (奎) (6499) stars are at the ordinal *Mao*, the elm dies. In the eighth moon, when the *T'ien-kang* (天罡) (11208, 5906) stars are at the ordinal *Yu*, wheat grows. The ordinal *Tzŭ* in the south and the ordinal *Wu* in the north — they interregulate.

When the numbers from one to nine have been exhausted, a new start is made from the very beginning. The *yuan* (元) (13744) (primordial element) is being contained and the *chên* (真) (589) (reality, essence, truth) embraced, as the *ching* (essence) is transmitted to the offspring.

Chapter LXI.

" Kwan-kwan go the ospreys,
On the islet in the river.
The modest, retiring, virtuous, young lady:
For our prince a good mate she." *(trans. Legge)*

[So goes the classic ode.] The male does not live alone, nor does the female pass her days unconsorted. Mutually supporting, the tortoise and the snake entwine to form the *Hsüan-wu* (玄武) (4790, 12744) god. All these go to show that the male and the female do need one another.

But let there be two very beautiful maidens living in the same house. Also, let there be a *Su Ch'in* (蘇秦) (10320, 2093) to start the matchmaking and a *Chang I* (張儀) (416, 5455) to go between. Their persuasion and their praising of the one party to the other may succeed in bringing about the match. But the parties would never understand one another even if they should live together to old age.

When medicines of the improper kind and nature are used, or when the compounding is not properly done, law and order

will be upset. Under such conditions, even with *Huang-ti* to operate the furnace, with the Supreme One to confer blessing on the process by his presence, with the Eight Dieties (八神) (8504, 6568) to help compounding, with *Huai-nan* to control the fire, with sacrifice of dried meats of the *lin* and the *feng* (麟鳳) (7186, 3560) (female unicorn and male phoenix) and protracted, imploring prayers to the spirits offered, in the vain hope of success, on bended knees by the purified and dieting seeker at a dignified altar in a magnificent jade-stepped temple, even then failure will still be inevitable. For this is just as absurd as attempting to repair a caldron with glue, or to heal a boil with *nao* (砂) (8163) (sal ammoniac), or to get rid of cold with ice, or to get rid of heat with a hot fluid, or as reports of flying tortoises and dancing snakes.

Chapter LXII.

O, the sages of old! They held in their bosoms the elements of profundity and truth. Having compounded and partaken of the medicines prepared in the nine *tings* (furnaces), they were endowed with the power to disappear at will. They held the essence firmly and cultivated their spirit, and they thereby attained communion with the three primes. The essential fluids worked properly to give them fine, strong bones and muscles. With the various evils banished, the righteous [good] *ch'i* (ethereal essence) came to stay with them forever. In course of time they became immortals.

Their sympathy for those of posterity, who might have a liking for the attainment of the *Tao* (Way), led them to explain the writings of old with words and illustrations. They couched their ideas in the names of stones and in vague language so that only some branches, as it were, were in view and the roots were securely hidden. Those who had access to the discourses wasted their own lives over them. The same path of misery was followed by one generation after another with the same failure. If an official, his career was cut short; if a farmer, his farm was cluttered with weeds; if a merchant, his trade was abandoned; if an ambitious scholar, his family became destitute—in the vain attempt. These grieve me and have prompted the present writing. Although

concise and simple, yet it embraces the essential points. The appropriate quantities [and processes] are put down for instruction together with confusing statements. However, the wise man will be able to profit by it by using his own judgement.

Chapter LXIII.

Of all manifestations none are greater than the sky and the earth. Their span covers tens of thousands of miles. When the *Ho-ku* (河鼓) (3936, 6241) stars appear in the *Hsing-chi* (星紀) (4602, 922) galaxy, the people become frightened. If the times of the day and the night are shifted, nine years of misfortune will follow. The sub-ruler will beat a respectful retreat under the supreme-ruler's supervision. The *ch'i* (ethereal essences) go around by virtue of the highness and lowness of the controls. The rivers empty themselves into the sea without going dry.

The male and female principles of the sky and the earth ply between the ordinals *Tzŭ* and *Wu*. The ordinals *Yin* and *Shên* are the origin of *yin* (negative, female) and *yang* (positive, male); alternately in and out in a cycle they go. First the *Tou* (斗) (11427) constellation and then the stars *Chao-yao* (招搖) (466, 12916) are traced in the effort to adjudge the time.

Chapter LXIV.

Above, cooking and distillation take place in the caldron; below, blazes the roaring flame. Afore goes the White Tiger leading the way; following comes the Grey Dragon. The fluttering *Chu-niao* (朱鳥) (2544, 8246) (Scarlet Bird) flies the five colors. Encountering ensnaring nets, it is helplessly and immovably pressed down and cries with pathos like a child after its mother. Willy-nilly it is put into the caldron of hot fluid to the detriment of its feathers. Before half of the time has passed, Dragons appear with rapidity and in great number. The five dazzling colors change incessantly. Turbulently boils the fluid in the *ting* (furnace). One after another they appear to form an array as irregular as a dog's teeth. Stalagmites, which are like midwinter icicles, are spit out horizontally and vertically. Rocky heights of no apparent regularity make their appearance, supporting one

another. When *yin* (negativeness) and *yang* (positiveness) are properly matched, tranquility prevails.

Chapter LXV.

The Blue Dragon is with the *Fang* (房) (3440) constellation, six; it is of spring, of the *Chên kua*, of the east, and of the ordinal *Mao*. The White Tiger is with the *Mao* (昴) (7694) constellation, seven; it is of autumn, of the *Tui kua*, of the west, and of the ordinal *Yu*. The Scarlet Bird is with the *Chang* (張) (416) constellation, two; it is of winter, of the *Li kua*, of the south, and of the ordinal *Wu*. The three of them gather to form a family gathering. The two things in the beginning finally become three-five. The three-five combine into one and gather in one place. Treatment should be made according to the foregoing prescription in the appropriate number of days.

Chapter LXVI.

White at first and then yellow, it finally becomes red both on the outside and on the inside. This is called the first *ting* (furnace) and is as large as a grain of millet.

All this is the work of nature and has nothing to do with untoward doings. It is like the fact that the *ch'i* (ethereal essence) of the mountains and the waters rise to give clouds which then become rain. Again, it is like the reduction of mud to give dust and the destruction of fire to give earth.

The bark of the *nieh* (櫱) (8283) tree dyes yellow and the *lan* (藍) (6732) (indigo) dyes blue; the boiling of hides yields glue; and the *ch'ü nieh* (麴櫱) (3066, 8283) yeast ferments to give liquor. It is easy to get results when the starting materials and the desired products are of the same kind. Otherwise, it is very difficult.

Chapter LXVII.

This is indeed a marvelous art that I am writing about. I am speaking with deliberation. [This writing] is meant to be transmitted to posterity through thousands of years for their reference. This to them should be as clear as the stars threading

the Milky Way and as sure as the rivers running into the sea.

The aspirant should study this thoughtfully and thoroughly, viewing it from all angles. A thousand readings will bring out some points, and ten thousand perusals will enable him to see. At last revelation will come to bring him enlightenment. Careful study will open the doors to the secrets. Nature's *Tao* (Way) shows no partiality, but reveals to all who are worthy.

LXVIII. Ting Ch'i Ko (鼎器歌) (11268, 1123, 6046)
SONG OF THE TING

Circumference three-five, diameter one tenth of an inch, mouth four-eight, lip two inches, length one and two-tenths feet, and thickness equal throughout. With its belly properly set, it is to be warmed up gradually. *Yin* (negativeness) is above and *yang* (positiveness) runs below. The ends are strongly heated and the middle mildly warmed. Start with seventy, end with thirty, and two hundred and sixty. There should be thorough mixing.

The *yin* (negative, female, weak, etc.) fire is white and produces the *huang-ya* (Yellow Sprout) from the lead. Two-seven gathers to bring forth the man. When the brain [head] is properly tended for the required length of time, one will certainly attain the miracle. The offspring, living securely in the center, plies back and forth without coming out of doors. By degrees he grows up and is endowed with a pure nature. He goes back to the one to return to his origin.

Respectful care should be accorded, as by a subject to his ruler. To keep up the work for a year is indeed a strenuous task. There should be strict protection so as not to get lost. The way is long and obscurely mystical, at the end of which the *Ch'ien* (positiveness, male) and the *K'un* (negativeness, female) come together. The taking of so small a quantity of it as would cover the edge of a knife or spatula will be enough to confer tranquility on the *hun p'o* (man's animal spirit), give him immortality, and enable him to live in the village of the immortals.

Those who love the *Tao* (Way) trace things to their roots. They decide on the proper quantities [to use] in connection with the preparation of their medicine on the basis of the *Wu-hsing*

(the Five Elements). Careful reflection is in order, but no discussion with others should take place. The secret should be carefully guarded and no writing should be done for its conveyance.

When the aspirant is accomplished, he will ride on the white crane and the scaled dragon to pay respects to the Immortal Ruler in the Supreme Void. There he will be given the decorated diploma which entitles him to the name of a *Chên-jên* (True man).

LXIX. EPILOGUE

The *Ts'an T'ung Ch'i* is only an outline of principles written in a rather involved style and interspersed with extraneous material. The subject matter is treated in a general way but no details are divulged. In order to fill in omissions and further to elaborate the mystic profundity so that the nature of the great *I* (Change) shall be thoroughly treated, the present writing is undertaken and is entitled the Akinness of the Trio. It will be noted that the various writings are like the step-ladders used in the wars for surmounting city walls. For they help one another in the common purpose of clarifying the same subject.

The various manifestations of the *I* (Change) are brought about by their respective measure; the study of the *Huang-Lao* (alchemists) results in the foundation of their well regulated art; and the working of the furnace rests on a true basis. These three are all come of the same source.

When the roots are in good condition, the trunk, the branches, the leaves, the flowers, and the seeds will flourish. Words uttered from the depth of a true heart must be right.

A lowly man from the country of *Kuai*, who has no love for wordly power, glory, fame, or gains, who wastes his days leading a simple, quiet, leisurely, and peaceful life in a retreat in an unfrequented valley—such a one is the author of the present writing.

The writings on the *I* (Change) by the three sages have a common goal, which is to propound according to the *Li* (理) (6879) (Reason) and to cause the spirit to shine forth. When the activity-spirit moves about freely, peace will reign throughout the four seas. A chart is drawn up for men of the future to follow so as to enable them to carry out their processes in the proper order

and in a simple manner. He who properly cultivates his innate nature will see the yellow light shine forth as it should. He who augments his *Tê* (magnanimity-virtue) will be able to return to his true root and origin. The material for working is as close to one as his heart and is not apart from his body. Longevity will come to him who, besides giving whole-hearted devotion to the principle, will also partake of the drugs in the proper male and female proportions. There is no use for the eight stones or the magic earth of Mount *Wu-tu* ( ) (12698, 12050) in the process.

Proper processing is done according to the nature of the materials for the preparation of the drug which is held precious by the world. The trio [the Book of Change, the Taoists, and the Processing] are variations of the same thing under the guise of different names.

This writing is not mere rhetorical verbiage. It is an exposition of an unmistakable truth. Woe to me if I am spreading an untruth! The treatise is entitled *Ts'an T'ung Ch'i* so as to suggest its contents. The language used is abbreviated but meaningful. It is expected that posterity will follow the teaching.

The writer, abandoning ( ) (12557) the world and its evils for the mountains, roamed in space with the spirits ( ) (6430). He was then transformed into a *hsien* and thereby relegated into the realm of silence. Once in every hundred ( ) (8560) generations he descends to visit the world to exhibit his feathers in the East, West, and South. Should misfortune ( ) (8474) befall the hot fluid ( ) (10751), the water will dry up to bring a drought. Thereupon the leaves and branches of trees will wither and the flowers fade away. The various parts bear proper relations to each other to insure a safe and long life.

End of the Translation.

NOTES

Roman numerals refer to chapters

I. The *kuas* are the simple ideographs, composed of long and

short horizontal lines, which are discussed in the Book of Change. Their magical significance is apparent throughout the *Ts'an T'ung Ch'i* where they supply to WEI PO-YANG a means for the correlation of the three, the alchemical processes, the Book of Change, and the Taoist doctrines. They help to justify the title of the treatise and make the Trio appear to be, as he says in the Epilogue that they are, " variations of the same thing under the guise of different names." A full understanding of the occult relationships of the *kuas* would no doubt add greatly to the meaning which lies between the lines.

II. The process is evidently to be carried out for thirty days (which however is not exactly one moon), or, rather, it is to be repeated as many times during thirty days and thirty nights, heating by day (hard) and cooling by night (soft), sixty operations altogether.

III. This is an account, as clear as many a characteristic account in European treatises on alchemy, of certain details of the process. The treatment is to be repeated once every twenty-four hours from the time of the moonless night until the time of the new moon. But, since only two days intervene between the moonless night and the next new moon, and since the author has already said that the process requires thirty days—and he repeatedly makes reference to thirty throughout the treatise—it seems that the process is to be repeated every day from the time of the moonless night until the time of the new moon next after the one first following the moonless night. During the period between 11 p.m. and 11 a.m. the materials are to be heated (spring) and kept hot (summer), and during the period between 11 a.m. and 11 p.m. they are to be chilled (autumn) and kept cool (winter) by external applications. When the four seasons are thus followed, the five elements will work out properly.

V. 1. The first two sentences of this chapter are quite in the manner of the European alchemists. ZOSIMOS commences his treatise on calx by saying, " I am going to deliver to you things which are clear." (16) The author of the *Speculum Alchemiae* which is ascribed to ROGER BACON says that earlier writers have been obscure but that he will really explain the art.

(16) BERTHELOT, *Collection des Alchimistes Grecs*, Paris, 1887-1888. *Traduction*, p. 121.

"In times past philosophers have been accustomed to speak diversely and in many modes in their writings, for they have left us this science, which is really nobler than all others, inwardly obscured with enigmas and vague expressions. I reject such negative procedure in desperation, altogether, and not without reason.

"I admonish you therefore that you set your mind firmly on these seven chapters, more than on all the writings of others, and on the transformations of the metals which are contained in them, and that you revolve wisely the beginning, the middle, and the end in your heart. You will find such subtlety in them that your soul will be filled." (17)

The real or pseudo ALBERTUS MAGNUS, in the tract *de Alchemia*, asserts that earlier writers have been false and contradictory but that he will set forth the art clearly and infallibly and will describe nothing which he has not seen.

"Although I have traversed with the greatest labor many regions, and very many provinces, and even cities and castles, in the cause of the science which is called Alchemy, and have inquired diligently from men of letters and from wise men concerning this art in order that I might investigate it more fully, although I have written out in full all their notes and have very often sweated over their processes, I have nevertheless found nothing true among the things which their books affirmed. I have examined books of contradictions and affirmations and have found them to be empty of all profit and foreign to all good. I have found many wealthy men of letters, Abbots, Commanders, Canons, Physicians, and illiterate men who have made great expense and labor on account of this same art, and they also failed for they were not capable of investigating the art. But truly I have not despaired of making infinite labor and expense, being vigilant, going from place to place at all times, and meditating, as AVICENNA says, 'If this is the thing, in what manner is it? and if it is not, in what manner is it not?' I have likewise persevered in study, in meditation, and in labor on the processes themselves, until I have found out what I sought, not by my own science but by the grace of the holy Spirit. Then, when I might know and might understand

(17) *Theatrum Chemicum*, Ursellis, 1602. Vol. 2, p. 433.

what might conquer nature, I began more diligently to keep vigil with the decoctions, sublimations, solutions, distillations, cerations, calcinations, and coagulations of Alchemy, and in many other labors, until at length I found the transmutation to be possible into sun and moon which are much better than any natural material in every test and hammering.

"I who am truly the least of the Philosophers intend to write about the true art for my associates and friends, clearly and infallibly, but however in such manner that seeing, they may not see, and hearing, they may not understand. Wherefore I beg and adjure you, by the Creator of the world, that you hide this book from all stupid persons. To you indeed I will reveal the secret, but from others I conceal the Secret of secrets because of the envy of this noble science. For the stupid despise it because they are not able to grasp it, and thence hold it hateful and believe it not to be possible, and so envy those who work at it and call them forgers. Therefore beware lest you reveal any of our secrets in this operation. Again I advise you that you be cautious, persevere in the operations, and avoid fastidiousness for you know that great utility follows after your work.

"Now then in this Opusculum of mine I will inform you briefly and simply how you ought to devote yourselves to the labor of so great a work. But I will show you first all deviations and errors and stumbling-blocks of this art by which many and nearly all go astray. For I have seen certain men who made their sublimations with great diligence but were not able to go farther because they did not have the fundamentals. And I have seen others who had a good beginning but because of too much potation and other vanities were not able to accomplish the work. I have seen others who had made a good decoction, distillation, and sublimation, but who left the work unperfected because of too great prolongation of the operation. And I have seen others who had the true art and superintended the operations diligently, but lost the spirit during the sublimations because they used a porous vessel, and consequently doubted and later ceased to cultivate the art. And I have seen others who, desiring to investigate the art and not being able to await the required time, made their sublimations, distillations, and solutions too rapidly and obtained infected and rubiginated spirits and turbulent

dissolved and distilled waters—and they also doubted. And I have seen very many who prosecuted the work with diligence and nevertheless failed because they did not have the wherewithal for sustaining it. Whence the verse,

Labor without profit's ill,
And wisdom without money's nil.

Whence this art is of no value to the poor, because it requires expenditures for at least two years, especially if it should happen to go wrong in the operation or to be prolonged, even if it should not come to failure, as I have experienced in many cases. I have seen others who made pure and good sublimations five times, and when they were not able to make more, they falsified and whitened Venus by adding five or six parts of Luna, and deceived themselves and others. I have seen others who sublimed and fixed spirits, wishing with them to tincture Venus and Mars, and when they made no impression and had no entrance, they doubted. I have seen those also who had fixed spirits and cerated them by mixing with oil, whereby they had an entrance into bodies, adding to them however a certain portion of Luna, and thus they fixed Venus in white, which was similar to Luna by the test and by hammering and in whiteness, and which underwent a second and a third test and however was not perfect because Venus had not been calcined or purged of its corruption. Whence ARISTOTLE says, 'I do not believe that metals can be transformed unless they are reduced to their *prima materia*,' that is, to calx by the adustion of fire, and then it is possible. Moreover I have seen other wise men who sublimed and fixed spirits and powders in plenty, prepared solutions and distillations from the powders, afterwards coagulated them, and afterwards calcined metals, dealbated substances to white, rubified them to red, afterwards reduced the calx to a solid mass, and tinctured them into Sol and Luna which were better than any natural material in every test and hammering. Therefore, seeing so many go astray, I have now decided to write out the true, tested, and approved operations of all Philosophers in which I have labored and am experienced. May I write nothing unless I have seen it with my eyes." (18) Many of the points which are mentioned

(18) *Theatrum Chemicum*. Vol. 2, pp. 486-488.

in this passage are also mentioned at various places in the *Ts'an T'ung Ch'i.*

V. 2. The author builds up the idea of heating and cooling, relating *yang* and *yin* to the sun and moon which make up the Change by matching one another with their respective hardness and softness. In Chapter IV he has said that Change results from *yin* and *yang* being in matching positions, in Chapter VI he speaks of the sun and moon and adds that when *yang* is gone *yin* will come on to take its place, and in Chapter VII he tells that the sun and moon reach out for and hold one another.

IX. This may possibly mean that the sages carry out their processes after the pattern of the wax and wane of nature, or it may mean that they are guided by astrological omens, or it may mean simply that they are guided by circumstances and conditions—for their laboratories were not, as ours are, independent of the weather. ALBERTUS MAGNUS, whose laboratory in north Germany was lighted by openings through the stone walls of the building, very properly says that sublimations do not succeed in the winter time while solutions and distillations may be made at all times. A short treatise of ZOSIMOS deals with the question whether the work may be undertaken at any time whatsoever.

"It is necessary that we determine what are the opportune times.... The opportune time is the spring, for then the sun is of a nature for the operation.... Purple also needs a special time for the solutions and coolings. Likewise tear-drops of gum need the spring's own nature in order to flow spontaneously. I have, however, heard it said by certain ones that our operation can be carried out under any circumstances, and I hesitate to believe it." (19)

X. Since the process is started on the moonless night, the various parts of it correspond to the phases of the moon. After fifteen treatments have been performed, the full moon begins to wane and the crisis of the process is past; on the sixteenth day a notable difference appears. Others appear on the twenty-third day and on the thirtieth when the east will have lost its brightness for, as the next chapter states, at thirty the manifestations of Change are destroyed all of a sudden.

(19) BERTHELOT, *Alchimistes Grecs, Traduction*, pp. 156, 157, 158.

XI. Admonitions to be secret are common in the writings of the alchemists. ROGER BACON in the *Speculum Alchemiae* says, " Keep this secret more secret " (20) and in the tract *De mirabili potestate artis et naturae*, " I recall that secrets of Nature are not committed to the skins of goats and of sheep that anyone may understand them, as SOCRATES and ARISTOTLE have pointed out, and as the latter says in his *liber Secretorum*, ' He is a breaker of the heavenly seal who communicates the secrets of Nature and of Art,' adding that ' Many evils follow the man who reveals secrets.' " (21) The last agrees with WEI PO-YANG's statement that failure will be upon him who divulges the secrets. Compare also ALBERTUS MAGNUS, note V. 1., who urges that his book be hid from all stupid persons and that none of the secrets of the operation be revealed. In his *De Alchemia* he lays down eight precepts, the first of which refers to the matter of secrecy while several of the others have the same intent as advice which is given in the *Ts'an T'ung Ch'i.*

" The first precept then is that the worker in this art should be silent and secret, and should reveal his secret to no one, that he should offer nothing further in the way of explanation, knowing for certain that if many know he will accomplish nothing which is not divulged, and when it shall have been divulged, it will be reputed a forgery—and so will be in perdition, and the work will remain imperfect.

" The second precept is that the worker should have a place and a special house away from the sight of men, in which there are two or three arches in which the operations of subliming and of making solutions and distillations are carried on, as I will teach later.

" The third is that he should observe the time in which the operation is to be performed and the proper hours for sublimations, solutions, and distillations, for sublimations do not succeed in the winter-time while solutions and distillations may be made at all times. I will however teach clearly all these points about the operations.

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(20) *Theatrum Chemicum*. Vol. 2, p. 436.

(21) TENNEY L. DAVIS, *Roger Bacon's Letter concerning the Marvelous Power of Art and of Nature and concerning the Nullity of Magic*, Easton, Pennsylvania, 1923, p. 38.

" The fourth is that the worker in this art should be sedulous and frequent in his operations, and should not tire but should persevere to the end. Because, if he should begin and should not persevere, both time and substance would be lost.

" Fifth, that he should work according to the institutions of the art; first in contritions, second in sublimations, third in fixations, fourth in calcinations, fifth in solutions, sixth in distillations, seventh in coagulations, and so in order. If however he should wish to tincture before sublimation and to coagulate and dissolve by means of distillation, he will lose his powders, because, when they shall have been projected, they will very quickly fly away and he will not retain anything from them. Or, if he should wish to tincture with fixed powders which have not been dissolved or distilled, such powders do not incorporate or mix with substances.

" The sixth is that all vessels in which medicines ought to be put, whether water or oil, whether over the fire or not, the vessels ought to be of glass or glazed. For if acute waters are put in a copper vessel, they produce green substances from it; if in one of iron or lead, they are blackened and contaminated; if in one of earthenware, they will penetrate it and all will be destroyed.

" The seventh is that you ought to beware before all else of involving yourself with princes and potentates in any operation; because of two evils, for if you have involved yourself, they inquire after you from time to time and say, ' Master, how do you succeed? When shall we see something good? ' and, not being able to wait for the end of the work, they say that it is nothing, that it is *truffa*, etc., and then you will have the greatest of annoyance. And if you have not obtained a good result, you acquire everlasting indignation from it. If however you have obtained a good result, they think to detain you forever and will not allow you to go away, and so you will be ensnared by the words of your own mouth and entangled by your own speeches.

" The eighth precept is that no one ought to involve himself in these operations who has not abundant funds, at least enough to be able to provide all things which are necessary for the art and in fact all which are useful. And if he has involved himself

(22) *Theatrum Chemicum*. Vol. 2, pp. 491-492.

and funds lack, then the wherewithal and all else is lost."

XII. Heavenly signs again and proper seasons, but these are not all; look at the lay of the land and look into the human heart, compare these excellences and proceed accordingly but, as the next chapter says, be careful, circumspect, and mindful of details. Our author says in Chapter XXX that inferences should be made with care and measure, that it is easy to infer from the obvious but difficult to infer without any tangible clue, and in Chapter XXXVI that the sage uses his own judgement to arrive at the essentials. In Chapter XLII the admonition to watch the sky and the lay of the land is repeated.

XIII. The ordinations must be properly interpreted into action, otherwise untoward happenings occur. It is plain from several passages in the *Ts'an T'ung Ch'i* that WEI PO-YANG wishes the operator to follow his intuition and to use his own best judgement. The mediaeval Latin alchemists allowed less scope to individual judgement and insisted in the post-Aristotelian manner upon the authoritative procedure, compare note XI, the fifth precept.

XV. 1. Again thirty; compare notes II and III.

XV. 2. To be successful care must be exercised not only at the beginning, etc.; compare note XI, the fourth precept, and the statement in the next chapter that a right finish follows a proper start as shapely twigs spring from an upright tree.

XVI. Evidently a description of some part of the process.

XVIII. 1. The statements that white is the essence of gold and that gold is the mother of water, that yellow earth is the father of gold and flowing pearl the mother of water (Chapter XXVI), that gold is chiefly made up of sand and derives other properties from mercury (Chapter XXVIII), that the best attainable substance is like water, clear and flawless (Chapter XLV), that gold changes into water and the nature of water is quick (Chapter LVIII), that gold and water live together (Chapter LIX), and that gold is born under the influence of the moon (Chapter XXV) for the moon is *yin* as is evidenced by its production of water (Chapter XLVI), all these statements cohere fairly well and suggest a definite alchemical doctrine in which gold—or the metals in general, for the Chinese word can equally be translated metal—are derived from a negative principle or water which corresponds to the negative principle, mercury, of the

doctrines of ZOSIMOS, JABIR, and the mediaeval Latins. The statement that gold (or metal) is the mother of water may perhaps be a reference to the fusibility of the metals, a phenomenon in which later alchemists saw evidence of the presence of mercury.

XVIII. 2. The statement that lead is black on the outside but holds gold flower in its bosom may perhaps refer to the formation of yellow litharge when lead is burned in the air. But it seems more likely that it means that lead is an appropriate raw material for the transmutatory process, or as the Alexandrian chemists believed for the preparation of artificial gold. ALBERTUS quotes ARISTOTLE for the opinion that lead is leprous gold. OLYMPIODOROS says :

" In his turn PETASIUS the philosopher, speaking of the principle of the work, agrees with what has already been set forth on the subject of our lead and says, ' The sphere of fire is retained and enclosed by that of lead.' And the same author, acting as his own commentator, adds, ' This means starting from the product which comes from male water.' Moreover it is male water which he has called the sphere of fire. He has also said that lead is so possessed of the demon and so given to impudence that those who wish to learn the science fall into folly because of their ignorance of its properties.

" Two contrary qualities have been attributed to lead, for it gives at once the sensation of a liquid body and the sensation of a dry one. It possesses three properties in itself, it is white, yellow, and black; and it is also liquid. Take note that there are also four different kinds of yellow produced with lead. Lead undergoes two treatments more. It is right that the art has been based upon it, but wrong that it has been assigned a bright and shining character—as has been rightly done to the starry stone. For a similar reason most of the ancients have based the art on lead. ZOSIMOS says so, ' The All culminates in lead.' And further, ' Lead is our magnesia, it is liquid by nature.' Moreover, the slag of lead resembles the slag which is produced by the smelting of auriferous minerals. And it is especially for this reason that the art is made to reside in lead." (23)

XIX. Suggestions relative to the process. Refine the material

(23) BERTHELOT, *Alchimistes Grecs, Traduction*, pp. 104, 106, 107.

to externals and internals, to its ultimate *white* element which existed before the beginnings of the heavens and earth.

XX. Suggestions relative to the furnace; meandering passages for the condensation of sublimed material.

XXI. The unfortunate consequences of misjudging the procedure.

XXII. WEI-PO-YANG says, as the authors of European treatises do, that the directions given by earlier writers are to be mistrusted. Compare *Speculum Alchemiae*, note V. 1. The text reads that the descriptions " violate *Huang-Lao*," that is, they violate the art, the procedure of its followers, and the precepts of its legendary founders, namely, HUANG-TI, the Yellow Emperor (pl.5), and LAO-CHÜN (老君) (6783, 3269), the Master, the founder of Taoism. The name, *Huang-Lao*, in the Taoist writings means also alchemists or the followers of the art; compare the Epilogue, second paragraph. We have not been able to identify *Chiu-tu*, and are not sure that the words are a proper name.

The *Lieh Hsien Ch'üan chuan* (Complete Biographies of the Immortals) gives an account of HUANG-TI and tells that he secured copper and made a *ting* and ascended upon the Dragon, but mentions no details of his experiments in the preparation of the pill of immortality.

" In the nineteenth year after his ascension to the throne, HUANG-TI heard that KUANG-CH'ÊNG-TZŬ (廣成子) (6397, 762, 12317) was in the *K'ung Tung* (崆峒) (6597, 12271) Mountain. He went there to see him and said, ' May I inquire about the essence of the accomplished *Tao?* ' KUANG-CH'ÊNG-TZŬ answered, ' Ever since your ascension it has rained without the gathering of clouds and vegetation has faded before it has turned yellow. The light of the sun and moon have diminished more and more. How can you be qualified to aspire to the accomplished *Tao?* ' Thereupon HUANG-TI withdrew.

" Three months later he again went to see KUANG-CH'ÊNG-TZŬ. He found him lying with his head toward the south. He approached him on his knees, made two bows to him, and said, ' May I ask how to take care of my person so as to attain long life? ' KUANG-CH'ÊNG-TZŬ arose suddenly and answered, ' What an apt question! I shall tell you the essence of the accomplished

Tao. If one embraces the spirit in tranquility, his condition will be good of itself. So, if your heart is tranquil and your spirit pure, and if you do not strain your body nor dissipate your essence, you will then attain immortality.' The Emperor again made obeisance and said, 'You are indeed marvelous!' And he returned to cultivate his heart and take care of his condition.

"In the day-time his spirit visited the country of the *Hua-hsü-shih* (華胥氏) (5005, 4704, 9978). It was situated west of *Yen-chou* (冀州) (13066, 2444) and north of *T'ai-chou* (泰州) 10583, 2444). It was tens of thousands of miles away from the Middle Empire. The actual distance was not known for it could not be reached by wheel or by boat or even on foot. One could get there only in spirit. The country was without rulers. Its people had no indulgences. They did not love to live, nor did they loathe to die. And so they did not die untimely deaths. They did not hold themselves dear and they showed indifference to things. And so they did not have love and hatred. They did not turn against those who opposed them or favor those who agreed with them. And so they were not concerned with losses and gains. They were without love and favor. They were free from fear and hatred. They were not wet by water nor heated by fire. They were wont to stay in space as if it were solid and to lie in emptiness as if it were a bed. Clouds and fogs did not interfere with their power. Thunder and lightning did not trouble their hearing. Good and evil did not bother their hearts. Mountains and peaks did not hinder their steps. For it was the spirit that was moving about.

"When HUANG-TI awoke, he was well pleased with his accomplishment. He summoned LI MU (力牧) (6980, 8073) and others before him and said, 'His majesty has lived in retirement for three months. He has been able to cultivate his person. But the art of ordering things and affairs he has not acquired. His dream was such as to bring the knowledge to him that the *Tao* cannot be achieved through favor. He cannot tell you about the *Tao*.' Afterwards the world was in such good order as to be almost comparable to the country of the *Hua-hsü-shih*.

"HUANG-TI obtained copper from *Shou-shan* Mountain (首山)

(10014, 9663) and fashioned it into a *ting* at the foot of the *Ching-shan* Mountain (荊山) (2157, 9663). When the *ting* was made, there appeared from above a dragon, with gray whiskers, who offered his services to HUANG-TI. HUANG-TI mounted the dragon, and with him were some seventy members of his court and household. The rest of his retainers held on to the whiskers of the dragon. The whiskers gave way and caused HUANG-TI's bow to fall to the ground. The people gazed up at the Emperor until he was up and gone. When he was gone, they embraced the bow and the whiskers, and cried. Hence the place came to be known the *Ting-hu* (鼎湖) (11268, 4931) (Lake of the Ting) and the bow as *Wu-hao* (烏號) (12721, 3884) (the Crow's Cry)."

XXIII. Effect of the medicine; compare Chapter XXVII, also the last paragraphs of the Song of the Ting and the Epilogue.

XXIV. The process described in simple language—and the theory of it in Chapters XXV and XXVI.

XXVI. 1. The statement that they desire one another's presence in their inhalation and exhalation and that they long to be man and wife seems a clear reference to the *Yin-Yang* doctrine of the composition of the metals. Compare note XVIII. 1. ZOSIMOS says, "Above celestial things, below terrestial things; by the male and the female the work is accomplished." (24)

XXVI. 2. The merging together of the three natures, fire, water, and earth, by which they show their common origin, is not so easy to interpret.

XXVIII. Drugs of a nature similar to oneself must be used; things of similar nature go together. In the next chapter the author says that things of a different nature and kind are unwilling to unite and live together, and, in the Epilogue, that longevity will come to him who, besides giving whole-hearted devotion to the principle, will also partake of the drugs in the proper male and female proportion. ROGER BACON in the *Speculum Alchemiae* insists upon the fact that the philosopher's stone can transmute only a substance which has a nature allied to its own. "On this point I now reveal to you a great and hidden secret. One

(24) BERTHELOT, *Alchimistes Grecs, Traduction*, p. 147.

part ought to be mixed with a thousand parts of an allied substance, and the whole shut up tightly in a suitable vessel, etc.... always one part of this for another thousand of an allied substance." (25)

XXIX. A further description of the process. The start they make is improper; compare note XV. 2. On the profundity of the learned scholars, compare Chapter LXI, also a passage of the garrulous sixteenth century gentleman-alchemist of Guyenne, DENIS ZACHAIRE.

" Such are PYTHAGORAS, PLATO, SOCRATES, ZENO, HALY, SENIOR, RASIS, GEBER, MORIENUS, BONUS, ARNALDUS DE VILLANOVA, RAYMUNDUS LULLIUS, and many others who would be long to recount. From the most important of these we have compiled and assembled our present little work, but it is with difficulty that their books give testimony of it. For they have written in such sort (having the fear of God always before their eyes) that it is almost impossible to arrive at an understanding of this divine science by the reading of their books. As GEBER says in his *Sum*, ' It is necessary that the son of the science should not despair and should not turn himself aside from the knowledge of this divine work, for, while seeking and thinking frequently on the causes of natural compositions, he will arrive at it.' But he who expects to find it by means of our books will be very late when he arrives at it, because (he says in another place) ' they have written the true practice for their own selves, confusing with the manner of inquiring the means of coming at the perfect understanding of it,' a circumstance which has made him set down in the above-mentioned *Sum* the principal operations and the things which are requisite to our divine work in divers and variable chapters. Because, says he, if he ' set it down in rank and file, it would be understood in a day by anyone, or in an hour, so noble it is and admirable.'

" ALPHIDIUS has said the same thing, writing that ' the philosophers who have preceded us have hidden their principal intention under divers enigmas and innumerable equivocations to the end that the world may not be ruined by the publication of their doctrine,' as indeed it would be if the doctrine were published. For all practice of husbandry and cultivation of the soil, all trade,

(25) *Theatrum Chemicum*. Vol. 2, p. 442.

in short all that is necessary for the conservation of human life, would be lost because no one would wish to undertake it who had in his control so great a good as this.

" Wherefore HERMES, excusing himself at the beginning of his book, says ' My children, do not think that the philosophers have hidden this great secret out of the envy that they have for wise men and for those that are well instructed, but rather to hide it from the ignorant and malicious.' ' For ' (as ROSINUS says) ' by this means the ignorant would be made similar to the wise, and malicious and evil persons would use it to the damage and ruin of everyone.'

" GEBER makes similar excuses in his *Sum* in the chapter on the *Administration of the solar medicine*, saying that 'the children of doctrine must not marvel if they have spoken covertly in their books, for this is not for them but is for the purpose of hiding their secret from the ignorant under such variety and confusion of operations, and this while leading and directing the children of science by that very means to an understanding of it,' because (as he has written in another place) ' they have not written out the discovered science, unless for themselves, but have furnished the means for the understanding of it.' " (26)

XXX. Make cautious inferences until the intuition comes; compare notes XII and XIII.

XXXI. The obscurity of the descriptions of the process; compare ALBERTUS MAGNUS, note V. 1., and DENIS ZACHAIRE, note XXIX.

XXXII. A part of the process described. The last sentence of the chapter contains a clear reference to sublimation.

XXXIII. 1. Description of the process continued. The Dragon and Tiger are *yang* and *yin* (compare Chapter LIX, also Chapters XXIV, XXXV, and LI), or, as the European alchemists would say, Sulfur and Mercury. These are to be heated in a tightly closed vessel with a fire which is weak at the start and strong at the end. The same process, with the same characteristic features, is described in the *Speculum Alchemiae*.

" Another says, ' This work is similar in many respects to the creation of man, for, as the child is nourished at first with

(26) DENIS ZACHAIRE, *Opuscule Tres-Excellent de la vraye Philosophie naturelle des Metaux*, Lyon, 1612, pp. 58-62. (*Isis*, 8, 287-99, (1926)).

lighter foods until the bones are formed, then with stronger ones, so this magistery requires a slow fire by which it is acted upon in the manner of a decoction.' And always when we speak of a slow fire, we mean that the fire is to be augmented and made stronger gradually and in successive stages during the course of the work.

"If then we intend to imitate nature, we must necessarily have a furnace of the same sort, after the fashion of the mountain, not in size, but of such sort as to provide a continuous heat so that the fire imposed upon it shall not find an exit when it ascends and so that the heat shall reverberate the tightly closed vessel which contains within itself the material of the stone. Which vessel ought to be round with a short neck, of glass or of earthenware corresponding to the nature or compactness of glass, and its mouth ought to be closed with a suitable stopper and coated and sealed with bitumen. And as in the mines the heat does not touch directly the substance of the Sulfur and of the Quicksilver, because the earth of the mountain is everywhere between, so the fire ought not to touch directly the vessel which contains the above-mentioned materials. But this vessel must be placed within another vessel similarly closed, so that a temperate heat may better and more aptly reach the material above and below and from whatever side it may be. Whence ARISTOTLE says in the *Lumen Luminum* that Mercury is to be cooked in a triple vessel, which vessel may be of the hardest glass, or, what is better, of earthenware having the nature of glass." (27)

XXXIII. 2. The color changes into a purple. The Alexandrian alchemists regarded purple as the noblest of the colors, and supposed that it was the last of the several colors which were produced during the process of converting a base metal into artificial gold. From the time of ZOSIMOS, it was understood that the color sequence was black, white, yellow, and violet. (28)

XXXIII. 3. The great efficacy of the pills

XXXIV Evidently WEI PO-YANG was aware that the relative position of the sun and moon (and the earth) determines the

(27) *Theatrum Chemicum*. Vol. 2, pp. 438, 439-440.

(28) *Vide* ARTHUR JOHN HOPKINS, *Isis*, 7, 58 (1925); also *Studien zur Geschichte der Chemie : Festgabe für Edmund O. v. Lippmann*, Berlin, 1927, pp. 9 *et seq.*

appearance of the moon, whether crescent or full, etc. Compare the reference to the cause of eclipses in Chapter LVII.

XXXV. Reference to earlier masters of the art, HUANG-TI (see Note XXII), HUAI-NAN-TZŬ (see the Introduction), and to WANG-YANG whom we have not identified. For the admonitions at the end of the chapter, compare notes V. 1. and XI. The unworthy ones cannot aspire to this : compare GEBER in the *Sum of Perfection*.

" If they say *Philosophers* and *Princes* of this *World*, have desired this *Science* and could not find it, We answer, *They lie*. For some *Princes* (though few) and especially the *Ancient* and *Wise Men* found in Our *Time*, have (as is manifest) by their *Industry*, found out this *Science;* but would never by *Word* or *Writing* discover the same to such *Men*, because they are unworthy of it. Therefore *They* not seeing any to possess this *Science*, conceive an *Error* in their *Minds*, and thence judge that none have found it." (29)

XXXVI. 1. Hard and soft; *Yang* (male) donates and *Yin* (female) receives. Compare notes V. 2., XVIII. 1., and XXVI. 1., also Chapters XLIV, XLV, LVI, and LVII.

XXXVI. 2. In this chapter and the following, again the reference to sixty, thirty repetitions of the change, sixty operations, compare notes II and III. This does not agree with the statement in Chapter XXXIII that there are twelve divisions to the cycle.

XXXVI. 3. Beware of by-paths; compare note V. 1., also the following passage from *Le Texte d'Alchymie*.

" I have set you in a good road; follow it always and do not take it into your head to take lanes and by-ways believing to shorten your work and to arrive sooner at the end of your desires. You would make a great mistake to do so, for it is only the great road which leads to the great work. The beginning is a little rude, rugged, and difficult to take, but the farther one goes, the more it smoothes out and the more beautiful discoveries he makes. As you follow this road cast your eye to the right and to the left—you will see only beauties and marvels; and, if you look back, you will see that the country where you are

(29) *The Works of Geber Englished by* RICHARD RUSSELL, 1678 : *A New Edition with Introduction by* E. J. HOLMYARD, London, Toronto, and New York, 1928, p. 38.

is a thousand times more agreeable than that through which you have passed. But if you cast your eye far ahead into a country very distant from that where you are, take care not to lose your way by forcing yourself to see things to which you cannot pay adequate attention. Continue always to advance along your road, and in due time your curiosity will be satisfied.

" But, if you take some other route, thinking by its means to arrive at the place where you propose to go, I assure you that you will be misled, and that, the farther you advance in these by-ways, the farther you will be from the great and veritable road, in such sort that you will be altogether bewildered and will not be able any more to find the true road that you had taken at first." (30)

XXXVII. The apparatus should not be used except at the proper time; compare note IX. The admonition is repeated in the following chapter.

XXXVIII. More admonitions. The unfortunate consequences of a slight departure from the right path.

XXXIX. Repetition of the instructions given earlier, four seasons, cycles, etc.; compare notes II and III also Chapters XLI, XLII and LXIII.

XLI. The four parts of the cycle described, growth and decay, and finally a return to the beginning. Dangers on all sides and the necessity for a careful watch. Emphasis on the fifteenth day, the twenty-third, and the thirtieth; compare note X.

XLII. The four cycles described again and further admonitions given—to watch the lay of the land and observe the sky.

XLIV. The lighter component of the Sun is *yang* and the heavier component of the Moon is *yin*.

XLV. 1. Nine restorations and seven returns, eight home-goings and six stayings-on : total thirty.

XLV. 2. White is male and red female. The idea of the intimate combination of the positive and negative principles, there also represented as white and red, is found in *Le Texte d'Alchymie*.

" This is our double Mercury, this substance white on the outside and red on the inside. It is of this that the philosophers have intended to speak when they have said that it is necessary

(30) *Le Texte d'Alchymie et le Songe-Verd*, Paris (D'HOURY), 1695, pp. 96-98.

to whiten the red and to redden the white, for the beginning and end of the work consists only in that. It is in this Mercury that the true Sulfur of the philosophers is contained, which aids the artist to perfection it and without which a man would lose his time, his pains, and his work. Our Sulfur is not vulgar (say the philosophers), but is fixed and does not volatilize. It is of a mercurial nature and of no other.

" Therefore, my child, you see very well that I have declared all to you when I have made you understand in what manner our Sulfur is contained in the belly of the Mercury, and that it is correct to call it internal Sulfur or hidden Spirit, which is no other thing than heat and dryness acting on the cold and moisture, acting on the patient, the pure mercurial substance of which the Sulfur is the soul, since it is it which vivifies and sustains the Mercury, which would be, without our Sulfur, only a dead, unfruitful, and sterile earth. There is then good reason to say that Sulfur and Mercury are the proper and true substances of the metals. But we do not say that Sulfur and Mercury are the true substances of the metals, because it is very certain that this Sulfur cannot be without Mercury and that our Mercury cannot be without this Sulfur which is intimately united and incorporated with it, as the soul is with the body." (31)

XLVI. The Sun is *Yang* and the Moon is *Yin*. Compare Chapter VII, contact of the nebulosities establishes the foundation of all things.

XLVIII. The futility of deviating from the right course.

XLIX. This appears to be a fairly clear description of a part of the process and of the behavior of the material which is called Gold Flower.

L. The statement that ideas about the five elements can be transmitted orally but that it is difficult to put them down in writing seems to be another way of advising the worker to use his own best judgement; compare notes XII and XIII.

LI. 1. Heating and cooling; compare notes III and V. 2.

LI. 2. The easterly turn between 11 a.m. and 1 p.m. is evidently a turn toward the rising sun, toward *Yang*, toward greater warmth. The directions of this chapter then are contrary to those of

(31) *Le Texte d'Alchymie*, pp. 86-88.

Chapter III in which cooling is prescribed for the hour of *Wu*.

LI. 3. Chapter LIX states that Dragons are *Yang* and Tigers are *Yin;* hence *Yang* breathes into *Yin* and *Yin* receives the spirit from *Yang*, etc.

LII. The consequences of pretense and error.

LIV. The certainty of natural law.

LV. Without even showing the trail of her path, apparently a reference to invisible vapors during sublimation.

LVI. 1. The process must take place naturally.

LVI. 2. The statement that a man lies on his belly and a woman on her back, after death as well as in life, is probably a reference to the postures which the bodies assume after drowning. It is curious that a similar opinion, reversed with respect to the sexes, was prevalent in Europe from the time of PLINY. " That women drowned swim prone but men supine, or upon their backs, are popular affirmations, whereto we cannot assent.... The reason yet currant was first expressed by PLINY, *veluti pudori defunctarum parcente natura*, nature modestly ordaining this position to conceale the shame of the dead, which hath been taken up by SOLINUS, RHODIGINUS, and many more : This indeed (as SCALIGER tearmeth it) is *ratio civilis non philosophica*, strong enough for morality or Rhetoricks, not for Philosophy or Physicks : for first, in nature the concealment of secret parts is the same in both sexes and the shame of their reveale equall : so Adam upon the taste of the fruit was ashamed of his nakednesse as well as Eve : and so likewise in America and countries unacquainted with habits, where modesty conceales these parts in one sex, it doth also in the other; and therefore had this been the intention of nature, not only women, but men also had swimmed downwards, the posture in reason being common unto both where the intent is also common." (32)

LVII. The statement that the moon is masculine and the sun feminine is plainly due to an error in the text, but the error is not maintained for it is stated that as the *Yang* (sun) loses its *ch'i* the *Yin* (moon) is deprived of its brightness—an explanation of the waxing and waning of the moon. In eclipses the sun and the moon cover and contain one another.

(32) Sir THOMAS BROWNE, *Pseudodoxia Epidemica : or, Enquiries into Very many received Tenents, And commonly presumed Truths*, London, 1646, pp. 193, 195.

LIX. There was chaos which was presently classified into positive and negative.

LX. The Dragon, *Yang* or *Kang*, the male or hard principle, occupies the place of the rising sun while the Tiger, *Yin* or *Jou*, the female or soft principle, occupies the west.

LXI. The proper materials must be used and the compounding must be properly done, otherwise even the old masters, HUANG-TI (see note XXII) and HUAI-NAN-TZŬ (see the Introduction) could not make the process succeed. The last sentence of the chapter indicates an appreciation of the certainty of natural law. As *Le Texte d'Alchymie* says, " A gardener for example can very well make a pear-tree produce apples and plums, but he will never be able with all his industry to bring about that a walnut-tree should produce pumpkins, that a vine should bear cherries, or that a fig-tree should produce mulberries." (33)

LXII. The *hsien* in consequence of the medicines which they used were able to appear and disappear at will, etc. But the vague language in which they explained their processes led their followers into grievous misfortune. The present author however is writing concisely and simply, and takes up all the essential points; compare note V. 1., *Speculum Alchemiae*. The worker is advised to use his own best judgement; compare notes XII, XIII, and L.

LXIV. Another description of the process. Evidently the White Tiger volatilizes first, the Gray Dragon afterward. A violent reaction takes place.

LXV. An obscure symbolic account of the procedure. Treatment should be made according to this description.

LXVI. All this is the work of nature. It is easy to get results when the starting materials and the desired products are of the same sort. Otherwise, it is very difficult. Compare the statements in Chapter XXIX that things of different nature and kind are unwilling to unite and live together, that ten thousand failures will come from a thousand attempts; also note XXVIII.

LXVII. A thousand readings will bring out some points. " Read," says the author of *Le Texte d'Alchymie*, " and reflect upon your studies. If you find no sense in them, read the same

(33) *Le Texte d'Alchymie*, p. 78.

books again, then read others, in such manner that those which you shall have read the first will be able to make you understand the last....

" My child, I am not the only one who has declared the true substance to you. All of the philosophers have written of it as well as I, but in obscure and more shadowy terms. The reason you do not understand their writing is that they have not wished to observe in their books an order which would serve as a means of making them understood. Certain ones have begun their treatises with the end of the subject, others with the middle, others with the projection, ot ers with the multiplication, and one other has treated of the middle and end of the work and has expressly omitted its beginning. They have all affected a confusion—from which, however, it is not impossible to extract the whole truth, but, before developing this chaos, it behooves you to read only a few books (provided they are good ones). It is necessary to read them and re-read them without being disheartened, for if you do not understand them the first time you will understand them the tenth.

" I swear to you on the faith of a philosopher that you will find by this means what you desire. Although this way may appear tiresome to you, it is by so much the shorter, the surer, and the more comfortable—for all the experiments and all the practice, without a true knowledge and without a perfect theory, will not make you wise in our art. All possible sophistications will not instruct you in the least. Work according to the intentions of nature, follow the road that she has tracted for you, and imitate her in all things. Nature makes clever." (34)

LXVIII. Song of the Ting. The statement that the *yin* fire (soft or gentle fire) produces *huang-ya* (yellow sprout) from lead seems to identify *huang-ya* as litharge. Lead which is heated in the air at a moderately elevated temperature, preferably slightly above its melting point, becomes coated with the yellow oxide, litharge, which may easily be conceived to sprout from the shiny molten metal.

The third paragraph agrees with Chapter XXXIII as to the size of the pill which ought to be taken, and makes it clear

(34) *Le Texte d'Alchymie*, pp. 39, 68-70.

that the pill produces not mere longevity but real immortality.

LXIX. EPILOGUE. This section, in the text of *Yü Yen* which we have used, carries a heading which means *Preface*, but it actually follows the rest of the *Ts'an T'ung Ch'i*. The Epilogue virtually constitutes the treatise on " The Akinness of the Five " to which reference is made in the Introduction. Thus, if that portion of Chapter XI which begins with the words, " This is like the middle of winter," and runs to the end of the chapter be inserted after the third paragraph of the Epilogue, and if the expression, " Akinness of the Trio " in the first paragraph be changed to read " Akinness of the Five," then the Epilogue is a translation of " The Akinness of the Five " in the form in which that treatise is printed in Vol. 623 of the Collected Taoist Classics (Commercial Press, Ltd., Shanghai) where it appears to have been edited by CHU HSI or CHU-FU-TZŬ. The expression, " These three are all come of the same source," in the second paragraph of the Epilogue, also occurs in " The Akinness of the Five " and makes it more difficult to understand what the Five are which are mentioned in the title of the latter treatise. The text of the Epilogue, or of " The Akinness of the Five," is embodied entirely within the text of the *Ts'an T'ung Ch'i* in the version of P'ENG HSIAO (彭曉) (8887, 4313) which is also printed in Vol. 623 of the Collected Taoist Classics.

The Epilogue appears to be the author's *apologia* for writing on the art of the *Huang-Lao*, together with certain admonitions relative to the practice of the art and certain information relative to the author himself. The author claims that he has already attained the state of a *hsien*. And in the concluding paragraph, the text of which is reproduced herewith (pl. 6), he conceals his name in a cryptogram. YÜ YEN comments on this passage as follows.

" This is a cryptogram of the three words, *Wei Po-yang* (魏伯陽). The mutual support of the characters, *Wei* (委) and *Kuei* (鬼), makes up the word, *Wei* (魏). Below *I* (一) (5342) in the word, *Pai* (百), is *Pai* (白) (8556), which in mutual support with *Jên* (人 or 亻) (5624) makes up the word, *Po* (伯) (9340). *T'ang* (湯) meeting with drought and lacking

Sui (氵 or 氺) (water) gives *Yang* (昜) (12874); that which pairs with *o* (元) (8470) in the word, *o* (阮) (8474), is *Fou* (阝) (3606), which latter in mutual support with *Yang* (昜) makes the word, *Yang* (陽). The implication of the venerable *Wei's* writing is intricate indeed."

The European alchemists frequently concealed their names in a somewhat similar manner. In the *Ordinall of Alchimy*, (35) for example, the author's name and place of residence may be found by writing consecutively the first syllable of the Proem and the first syllable of each of the first six chapters. This gives—*Thomais Norton of Briseto.*

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(35) *The Ordinall of Alchimy by Thomas Norton of Bristoll* with Introduction by E. J. Holmyard, London, 1928. The treatise was written in the fifteenth century.

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Enquiry into the Authorship of the Ordinall of Alchimy

Although THOMAS NORTON, the acknowledged author of the *Ordinall*, is supposed to have lived in the fifteenth century, during the reign of EDWARD the FOURTH, his name only became known in the seventeenth century (1) when in 1618 MICHAEL

(1) This inconsistency has been commented on by other writers, and they will be referred to later. We have noted the following points which are of interest. i) The *Catalogus Librorum Bibliothecae*... of D. JOH. DEE, dated A° 1583, 6 Sept. and reproduced on pp. 65-89 in the HALLIWELL ed. of *The Private Diary of Dr. John Dee*... London (1842), contains no reference to the *Ordinall*, which is remarkable considering the wealth of DEE's collection in transcripts of alchemical works. In this connection we may add that we are aware of the fact that the M.S. *Ashm.* 57; see BLACK, ... *Catalogue of the Manuscripts bequeathed unto the University of Oxford by Elias Ashmole*... col. 94, Oxford (1845); has a note written by ASHMOLE: "John Dee A°. D'ni 1577. This following booke (called Norton's Ordinall) was transcribed by the hand of D^r. JOHN DEE...," but this increases the mystery as to why it was not included in the catalogue made by DEE in 1583. Again it must be noted that JAMES, "Lists of Manuscripts formerly owned by Dr. John Dee," *Supplements to the Trans. Bibliogr. Soc.*, London (1926), also makes no reference to the M.S. However, JAMES (p. 8) states that he has collated HALLIWELL's text "without finding any important differences." ii) BEN JONSON in *The Alchemist*, a comedy produced for the first time in 1610 and printed in London in 1616, does not mention THOMAS NORTON, although he refers to most alchemists, both English and foreign, who lived before that date. For an appreciation of the exactness with which *The Alchemist* is written and an evaluation of this work in the light of the history of chemistry see the article on "Alchemy" by STEELE, SIMPSON and ONIONS in *Shakespeare's England*... i, p. 467, Oxford (1916). iii) ASHMOLE's reproduction of "BLOOMEFIELDS BLOSSOMS: OR, *The Campe of* PHILOSOPHY," in the *Theatrum Chemicum Britannicum*... pp. 305-323, London (1652), does not mention THOMAS NORTON, although reference is made to quite unknown English alchemists such as RICHARD RECORD, HUGH OLDCASTLE and Sir ROBERT GREEN, who are described as "Foolosophers" (p. 309) as opposed to the true "Philosophers" such as HERMES, ARISTOTLE, MORIEN, DEMOCRITUS etc. (p. 308). iv) No reference is made to THOMAS NORTON in his "Catalogus Auctorum" by LAGNEUS in "Harmonia Chemica" (preface dated 1611), *Theatrum Chemicum*... iv, pp. 808-812 and pp. 713-716, Argentorati (1613 and 1659), although JOANNES DASTINUS, JOANNES GARLANDIUS, GEORGIUS RIPLEUS, JOANNES DUNS

MAIER (2) published his *Tripus Aureus*... (3), a collection which contained the *Practica* and *duodecim Claves* of BASIL VALENTINE, The *Crede Mihi seu Ordinale*, " ante annos 140, ab authore scriptum, nunc ex Anglicano manuscripto in Latinum translatum," of

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SCOTUS, MICHAËL SCOTUS and RICHARDUS ANGLICUS are listed. In this connection it is interesting to note that LANCILLOTTI in his " Avtori citati in queste due Oppere " (p. 34 of *Farmaceutica Antimoniale*) to *Farmaceutica Antimoniale*... and... *Mercuriale*... Modona (1683) gives NORTON. v) SENNERT, *De Chymicorum*... *Liber*... pp. 19-59, Wittenbergae (1619), in the two chapters entitled " De Veritate et Dignitate Chymiae " and " De Inventoribus & Cultoribus Chymiae," two most valuable contributions, makes no reference to either the *Ordinall* or its author.

(2) For the life of MICHAEL MAIER (1568?-1622) see CRAVEN, *Count Michael Maier*... Kirkwall (1910); REDGROVE, *Alchemy: Ancient and Modern*... p. 72, London (1911); WAITE, *The Brotherhood of the Rosy Cross*... p. 310, London (1924); KOPP, *Beiträge zur Geschichte der Chemie*, p. 17, Braunschweig (1869), deals with MAIER (which he wrongly spells MAYER) too harshly. MAIER was a charlatan but an honest student of the history of chemistry, as is evident from his *Symbola Aureae Mensae Duodecim Nationum*... Francofurti (1617).

(3) For an exact bibliographical description, checked by us, of the *Tripus Aureus*... (1618) and the reprints of the Latin version of the *Ordinall* in MANGET, *Bibliotheca Chemica Curiosa*... ii, p. 285, Genevae (1702) and the *Musaeum Hermeticum Reformatum et Amplificatum*... p. 433, Francofurti et Lipsiae (1749), see FERGUSON, *Bibliotheca Chemica*... ii, pp. 65, 68, 119, Glasgow (1906). All three versions are identical with the exception of the following slight differences : i) The *Tripus Aureus*... has on p. 78 an epigram by M. M., which is reproduced in the *Musaeum Hermeticum*... but not in MANGET. ii) The titlepage of the *Ordinall* in the *Tripus Aureus*... is illustrated as shown by us in Plate II, but neither the *Musaeum Hermeticum*... nor MANGET has this illustration. iii) The wording of the titlepage in the *Tripus Aureus*... and in the *Musaeum Hermeticum*... is shortened in MANGET by the words shown in brackets . " Thomas Norton (Angli) Tractatus (Chymicus Dictus) Crede Mihi seu Ordinale (Tractatus Secundus)." Curiously enough, although the *Ordinall* is the *twelfth* tract in the *Musaeum Hermeticum*... the description " Tractatus Secundus " of the *Tripus Aureus*... has been adhered to.

All these three Latin versions contain only one illustration as compared with the English original in ASHMOLE's *Theatrum Chemicum Britannicum*... pp. 1-106, London (1652), which contains six illustrations, one in the middle of page 28, the others facing pp. 13, 45, 50, 90 and 103. None of these illustrations can, however, be identified with the one given in the *Tripus Aureus*... and in the other two Latin versions. In this connection it must be noted that the illustration in the *Tripus Aureus*... is the same as the one used by LAMBSPRING, *De Lapide Philosophorum*... in the *first* edition of the *Musaeum Hermeticum*... p. 445, Francofurti (1625). This would suggest that MAIER has introduced it into the *Ordinall* on his own authority. That he was quite capable of doing so is evident from the fact that he uses the illustration shown on Plate II, i) as the titlepage of the *Ordinall* in the *Tripus Aureus*... and ii) as " Raymundi Lullij... Symbola " in his *Symbola Aureae Mensae*... p. 405, Francofurti (1617). With reference to ASHMOLE's version of the *Ordinall*, attention must be drawn to the frequent error

THOMAS NORTON and the *Testamentum* of CREMER. According to ASHMOLE (4) MAIER " *came out of* Germanie, *to live in* England; *purposely that he might so understand our* English Tongue, *as to Translate* Norton's Ordinall *into* Latin *verse, which most judiciously and learnedly he did*." ASHMOLE is, however, here carried away in his attempt to prove his preceding statements that " *Our* English Philosophers *Generally*, (*like* Prophets) have received little honour *(unlesse what hath beene privately paid them)* in their owne Countrey " and that " in Parts abroad *they have found more noble* Reception, *and the* world *greedy of obteyning their* Workes." It is well known that MAIER spent only a short time in England on a Rosicrucian mission (5) and it seems that he used his time in England to ingratiate himself with men of influence (6)

which assumes that the English is a translation from the Latin; compare for example SMITH, *John Dee*, p. xvi, London (1909), who says that the copy in ASHMOLE's *Theatrum Chemicum Britonum* (sic !) is " the first English translation of Thomas Norton's Ordinall of Alchemy, a metrical treatise in Latin..."

In addition to the three Latin versions mentioned above and the English one by ASHMOLE, accurately described by BOLTON, *A Select Bibliography of Chemistry*... p. 952, Washington (1893) ,and recently reproduced in facsimile with an introduction by HOLMYARD, London (1928), there are also the following printed versions of the *Ordinall :* i) The Latin translation in the *Musaeum Hermeticum*... Francofurti (1677 and 1678), quoted by LENGLET DUFRESNOY, *Histoire de la Philosophie Hermétique*... iii, p. 47, Paris (1744), which we have seen. This edition gives the *Ordinall* on p. 433, without illustration of the titlepage. ii) A German translation derived from MAIER's Latin translation, entitled *Chymischer Tractat Thomae Nortoni eines Engelländers, Crede Mihi seu Ordinale genandt*... Franckfurt am Mayn (1625), not seen by us. This version has been dealt with by FERGUSON, *Bibliotheca Chemica*... ii, p. 144, Glasgow (1906) and fully analysed by GRAVEN, *Count Michael Maier*... p. 95, Kirkwall (1910), who mentions the *seven* alchemical plates by DE BRY contained in it. iii) An English prose version by WAITE, translated back from the Latin translation by MAIER, in the *Hermetic Museum*... London (1893), not seen by us, but referred to by CRAVEN, *Count Michael Maier*... p. 95, Kirkwall (1910) and by REDGROVE, *Alchemy : Ancient and Modern*... p. 57, London (1911).

(4) ASHMOLE, *Theatrum Chemicum Britannicum*... Prolegomena p. (2), London (1652).

(5) See WAITE, *The Brotherhood of the Rosy Cross*... pp. 310-339, London (1924).

(6) The following is typical of MAIER. In addition to dedicating his *Arcana Arcanissima* to Sir WILLIAM PADDY he had copies made with the dedication omitted, in place of which he inserted in manuscript such inscriptions as : " To the Right Worshipful and most Worthy favourer of all vertues, Sir Thomas Smith, Knight, etc., Michael Maierus, Med. D., etc., author, wisheth much health and prosperous felicitie, and al increase of worship in this life, etc."; see CRAVEN, *Count Michael Maier*... p. 5, Kirkwall (1910), where this dedication is reproduced in facsimile.

and especially of importance to the Rosicrucian movement (7), such as Sir WILLIAM PADDY (8) and Dr. FRANCIS ANTHONY (9), to whom are dedicated the *Arcana Arcanissima* and the *Lusus Serius* respectively.

MAIER gives no reason in the *Tripus Aureus*... for ascribing the Ordinall to THOMAS NORTON, but he states in a previous publication (10), in which the *Ordinall* is described as still " uneditus," that : " THOMAS NORTONVS, *Bristouiensis, in arte perfectus magister, (ut habent initiales syllabae illius libri capitum, quem de hac arte condidit) agnoscitur; Scripsit rythmis Anglicanis*...".

ASHMOLE (11), without any reference to MAIER, arrives at the authorship of the Ordinall thus : " From the *first word* of this *Proeme*, and the *Initiall letters* of the *six* following *Chapters*... we may collect the *Authors* Name and place of Residence : For

It might be added that Sir THOMAS SMITH was the first governor of the East India Company, treasurer of the Virginia Company and " so much in favour with K. James that he sent him ambassador to the Emperor of Russia."

(7) MAIER's friendship with FLUDD, see CRAVEN, *Count Michael Maier* ... p. 6, Kirkwall (1910), is queried by WAITE, *The Brotherhood of the Rosy Cross*... p. 314, London, (1924).

(8) For Sir WILLIAM PADDY (1554-1634) see MOORE, *Dictionary of National Biography*, xliii, p. 35, London (1895).

(9) For Dr. FRANCIS ANTHONY (1550-1623) see PAYNE, *Dictionary of National Biography*, ii, p. 47, London (1885); *Encyclopédie des Sciences médicales*... i, p. 311, Paris (1840), where reference is made to " les ouvrages de François Anthony, comme ceux de tous les charlatans..."; HIRSCH, *Biographisches Lexikon*... i, p. 154, Wien and Leipzig (1884), where ANTHONY is described as " Arzt, Chemiker und Charlatan." MAIER was not lucky in the choice either of his patrons or of the authors selected by him for his *Tripus Aureus*... BASIL VALENTINE, whether a real person or not, is certainly a well known alchemical mystery; of CREMER, the supposed Abbot of Westminster and host of RAYMOND LULLY, there is no mention among the names of the Abbots of Westminster, and the visit of LULLY to England is itself shrouded in obscurity, see FERGUSON, *Bibliotheca Chemica*... i, p. 185. Glasgow (1906); and it seems as if THOMAS NORTON is as authentic as his two colleagues in the *Tripus Aureus*... READ, " The Romance of the Philosopher's Stone, " *Chemistry and Industry Review*, viii, p. 413, London (1930), who voices the same opinion as regards BASIL VALENTINE and CREMER, is however too confident in his statement : " Upon coming to ' Norton himself ' we are no longer dealing with a shadow."

(10) MAIER, *Symbola Aureae Mensae*... p. 467, Francofurti (1617). MAIER's digest of the *Ordinall* (pp. 467-476) deserves attention—as indeed does the whole work, which may be regarded as one of the early histories of chemistry. For an appreciation of the *Symbola Aureae Mensae*... see CRAVEN, *Count Michael Maier*... pp. 68-84, Kirkwall (1910).

(11) ASHMOLE, *Theatrum Chemicum Britannicum*... p. 437, London (1652).

those *letters*... speak thus, Tomas Norton of Briseto..." (12).

Although ingenuous, the evidence brought forward by MAIER and ASHMOLE can scarcely be accepted without criticism. The suggestion that THOMAS NORTON of Bristol wrote the *Ordinall* gains, however, in likelihood from the following reference by BALE (13) to " Thomas Norton, patria Bristollensis, alcumistarum... Nortonus composuit, *Alchimiae epitomen, Lib.* I. *Ad honorem Dei, in tribus personis. De transmutatione metallorum, Lib. I* " (14). " Et alia quadā. Claruit anno gratiae in Christo reuelatae 1477, sub Edvuardo eius nominis quarto Anglorum rege."

BALE makes no reference to the *Ordinall* (15), but since the *Ordinall* concludes (16) :

" In this yeare of *Christ* One thousand foure Hundred seaventy and seaven,
This Warke was begun, *Honour to God in Heaven.*"

contact seems to be more or less established between the THOMAS NORTON of Bristol who wrote in 1477, mentioned by BALE, and the TOMAS NORTON of Briseto, the supposed author of the *Ordinall*, which was begun in 1477.

(12) ASHMOLE, *Theatrum Chemicum Britannicum*... p. 437, London (1652), writes " Tomas," and not " Tomais " as required by p. 13 of the *Ordinall*, where Chapter I begins " MAIstryefull merveylous..." SIMPSON, " St. Peter's Hospital, Bristol," *Trans. Bristol and Gloucestershire Arch. Soc.*, xlviii, p. 202 (1926) states : " The letter ' i ' has been deleted in ink in Ashmole's copy." SIMPSON refers here to the M.S. *Ashm.* 971 in the Bodleian Library, which he describes as " Ashmole's own, with his MS. annotations." HOLMYARD, " Thomas Norton, an Alchemist of Bristol," *Chemistry and Industry Review*, i, p. 575 (1923) and also Introduction to the facsimile reproduction of *The Ordinall of Alchimy*, p. v, London (1928), in quoting ASHMOLE verbatim (p. 437), altered " Tomas " to " Tomais." This has been repeated by READ, " The Romance of the Philosopher's Stone," *Chemistry and Industry Review*, viii, p. 413 (1930), who also writes " Tomais."

(13) BALE, *Scriptorum Illustrium maioris Brytanniae*... fol. 67, Basileae (1559).

(14) BORRELL, *Bibliotheca Chimica*... p. 168, Parisiis (1654), writes : " Th. Nortoni de transmut. metallorum, liber vnus, Hic claruit anno 1447."

(15) POOLE and BATESON, *Anecdota Oxoniensia*... *John Bale's Index of British and Other Writers*... p. 447, Oxford (1902), go too far by adding to " Thomas Norton, Bristollensis, scripsit Alchimiam, li. i," footnote 5, " Printed in English by E. Ashmole...," as they have no evidence for it.

(16) ASHMOLE, *Theatrum Chemicum Britannicum*... p. 106, London (1652). The Latin versions conclude :

" Anno Christi 1477.
Hoc opus inceptum est, Deo sit gloria."

In accepting BALE's evidence it must however be realised that it is " ex Rob. Recordo," and this evidence, as far as we have been able to ascertain, is lacking (17). RECORDE was a keen student of astrology (18) and a collector of manuscripts, and any information he could have supplied would have been valuable. In 1551 he (19) was in charge of the mint in Bristol (20) at a time when on " July 12, the 12d. was cryed down to 9d., and the 4d. to 2d. In August, the 12d. was cryed down from 9d. to 6d., and the 4d. to 2d. and the 2d. to a penny, and the penny to a halfpenny, to the great loss of the King and his subjects... The pestilence reigned in the City of Bristol very sore for the time it lasted; for it swept away many hundreds every week..." (21).

Those were stirring days at Bristol—stirring enough for RECORDE, who soon afterwards (1558) died in a debtor's prison at South-

(17) POOLE and BATESON, who have published BALE's autograph notebook, *Anecdota Oxoniensia*... p. 447, Oxford (1902), write : " Thomas Norton, Bristollensis, scripsit Alchimiam, li. i. ' Ad honorem dei in tribus personis, edidi,' etc. Claruit sub rege Edwardo quarto, A.D. 1477. *Ex domo Ioannis Bushe*. Thomas Norton, scripsit De Transmutatione metallorum, li. i. Claruit sub rege Edwardo quarto. *Ex museo Roberti Recorde*."

BALE, *Scriptorum Illustrium maioris Brytanniae*... fol. 67, Basileae (1559), explicitly states that his reference to THOMAS NORTON is " ex Rob. Recordo," and this is not evident from the note in the POOLE and BATESON ed. of BALE's notebook. They also give on pp. 386 and 387 a list of published and unpublished works of ROBERTUS RECORDE, derived i) Ex Bibliopolis Londinensibus, ii) Ex officinis Bibliopolarum. iii) Ex museo eiusdem Recorde. This suggests some reference material in RECORDE's possession which we have not been able to trace.

(18) It would be interesting to ascertain what was the relationship, if any, between ROBERT RECORDE and the alchemist RICHARD RECORD, see ASHMOLE, *Theatrum Chemicum Britannicum*... p. 309, London (1652).

(19) For the life of ROBERT RECORDE (1510?-1558) and his appointment to the mint at Bristol, see SEDGWICK, *Dictionary of National Biography*, xlvii, p. 367, London (1896).

(20) During the great debasement of coinage from 1542 onwards, provincial mints were common in England. The coins were " blanched," that is coated with silver, before being issued, but they soon showed the copper through. A rhyme of the period runs :

" These testons look red, how like you the same?
" Tis a token of grace : they blush for shame."

See FEAVEARYEAR, *The Pound Sterling*... p. 59, Oxford (1931).

(21) EVANS, *A Chronological Outline of the History of Bristol*... p. 143, Bristol (1825); ADAMS's *Chronicle of Bristol*, ed. F. F. FOX, p. 100, Bristol (1910), gives under 1551 : " This year was the greatest mortality by pestilence in Bristoll that any man knew..."

wark (22), to produce a NORTON mythology which would look to transmutation for salvation.

With the appearance of the *Tripus Aureus*... in 1618, THOMAS NORTON (23) became a recognised figure in the history of chemistry (24). BORRICHIUS (25) places NORTON in his list of British chemists. In a subsequent work (26) he deals with THOMAS NORTON more fully : " Circa aetatem *Riplaei* prodiit in hoc genere " (27) " *Thomae Northoni Ordinale*, quod & in lingvam Germanicam transiit..." (28) " *Thomae Ordinale* magis probatur, & qvantum conjicere licet, viâ Regiâ procedit. Scripsit principatu Edoardi IV... Sed de *Thomae Northoni* scripto, ut & reliqvis lingvâ Anglicâ per *Eliam Ashmole* publicatis... accuratiùs judicabunt, qvi idiotisinorum lingvae ejus, qvàm ego, intelligentiores sunt." (29).

The position of THOMAS NORTON as the author of the *Ordinall* was accepted unchallenged by JUNCKER (30), GMELIN (31),

(22) See JÖCHER, *Allgemeines Gelehrten Lexicon*... iii, col. 1951, Leipzig (1751).

(23) MAIER, prior to the publication of the *Tripus Aureus*..., refers to THOMAS NORTON in *Symbola Aureae Mensae*... p. 468, Francofurti (1617) : " Quo tempore vixerit et librum suum finierit, ipse in calce eius adijci, nempe regnante in *Anglia Edwardo Quarto*. Anno 1477. ab hinc centesimo quadragismo."

(24) ROBERTUS VALLENSIS, *De veritate et antiquitate artis chemicae*... Parisiis (1561)—the first history of chemistry—makes no reference to THOMAS NORTON, although he mentions DASTINUS in his list of authors *ex philosophis*. FERGUSON, *Bibliotheca Chemica*... i, p. 199, Glasgow (1906), places DASTIN in the early part of the fourteenth century, about 1311 to 1320.

(25) BORRICHIUS, *De Ortu, et Progressu Chemiae, Dissertatio*, p. 144, Hafniae (1668).

(26) BORRICHIUS, *Conspectus Scriptorum Chemicorum*... p. 26, Hafniae (1697); MANGET, *Bibliotheca Chemica Curiosa*... i, p. 46, Coloniae Allobrogum (1702).

(27) With reference to *Georgij Riplaei XII. Portae*, BORRICHIUS writes in the preceding article : " Floruit *Riplaeus* Edoardo IV. regnante, eidemq'; anno Christi MCCCCLXXVII. opus hoc dedicavit..."

(28) BORRICHIUS refers here to the German translation described by FERGUSON, *Bibliotheca Chemica*... ii, p. 144, Glasgow (1906).

(29) The concluding remark is typical of BORRICHIUS, who never hesitated in acknowledging ignorance, a faculty not shared by his opponent CONRINGIUS. The two works, CONRINGIUS, *De Hermetica Aegyptiorum*... Helmestadii (1648) and BORRICHIUS, *Hermetis, Aegyptiorum, et Chemicorum Sapientia ab Hermanni Conringii... Vindicata*, Hafniae (1674), are full of instances.

(30) JUNCKER, *Élémens de Chymie*... traduits... par DEMACHY, i, p. 35, Paris (1757).

(31) GMELIN, *Geschichte der Chemie*... i, p. 132, Göttingen (1797).

BRANDE (32), HOEFER (33), GERDING (34) and BROWN (35).

LENGLET DUFRESNOY (36) gives in his list of " Célèbres auteurs de la philosophie hermétique " (37) under 1455 " Thomas Northon, Anglois, Auteur estimé," but points out (38) under " Philosophes du XV. siècle " : " Ce n'est que dans le dernier siècle " (LENGLET DUFRESNOY wrote in 1744) " que l'on a connu Thomas *Northon*, Anglois; *Ashmole* avoit publié son Ouvrage dans sa langue originale, et Michel *Mayer* l'a donné en Latin... le sçavant *Olaus-Borrichius* le croit du milieu de ce siècle."

SCHMIEDER (39) writes : " Ein Landsmann und Zeitgenosse Ripley's war *Thomas Norton*... Von seiner Persönlichkeit weiss man nichts, indem erst seit 1600 sein Name genannt worden ist. Nur soviel ist gewiss, dass er unter Eduard IV. in England lebte und 1477 eine alchemistische Abhandlung in englischer Sprache geschrieben hat. Sie führt den Titel : *Crede mihi, seu Ordinale*."

KOPP (40), after referring to RIPLEY, wrote : " Dasselbe gilt von seinem Landsmann und Zeitgenossen *Thomas Norton*, über dessen Persönlichkeit man ganz in Dunkeln ist. Sein Namen wird erst nach 1600 genannt, zu welcher Zeit er aber von den

(32) BRANDE, *A Manual of Chemistry*... i, p. 24, London (1821). Neither DAVY, *Elements of Chemical Philosophy*... London (1812), nor THOMSON, *The History of Chemistry*, London (1830), refers to THOMAS NORTON. BRANDE seems to be the first English writer on the history of chemistry who mentions the *Ordinall*, which he describes as being " illustrated by several comical cuts."

(33) HOEFER, *Histoire de la Chimie*, 2me éd. i, p. 467, Paris (1866) : " Thomas Norton, Anglais d'origine, vivait sous le règne d'Édouard IV, contemporain de Louis XI. Il composa en 1477... un ouvrage contre les alchimistes de son temps, sous le titre : *Ordinale*, ou *Crede mihi*."

(34) GERDING, *Geschichte der Chemie*, 2 Ausg. p. 38, Leipzig (1869).

(35) BROWN, *A History of Chemistry*... 2nd. ed. p. 105, London (1920).

(36) LENGLET DUFRESNOY, *Histoire de la Philosophie Hermétique*... i, p. 470, Paris (1744).

(37) The " Chronologie des plus célèbres auteurs de la philosophie hermétique," pp. 459-486, is a remarkable production. It begins with 1996 B.C. and concludes with 1739 A.D. LENGLET DUFRESNOY seems to have had a liking for such lists and his *Recueil de Dissertations anciennes et nouvelles; sur les Apparitions*... ii, pp. 223-292, Avignon (1752) contains a similar " liste des principaux auteurs, qui ont traité des Esprits, Démons, Apparitions, Songes, Magie et Spectres."

(38) LENGLET DUFRESNOY, *Histoire de la Philosophie Hermétique*... i, p. 264, Paris (1744).

(39) SCHMIEDER, *Geschichte der Alchemie*, p. 246, Halle (1832).

(40) KOPP, *Geschichte der Chemie*, i, p. 74, Braunschweig (1843).

Alchemisten als Meister ihrer Kunst anerkannt wird," (41) " und eine Schrift cursirte unter seinem Namen " (42)... " Sie führt den Titel *Ordinale, seu Crede mihi*, und giebt als Zeit ihrer Abfassung das Jahr 1477 an." (43)

The whole position is, however, best summarised by STILLMAN (44) : " Thomas Norton, English writer who first appears in literature about 1600, and whose popular *Ordinal* is dated or misdated 1477."

The suggestion put forward by STILLMAN that the *Ordinall* may be misdated 1477 is however not confirmed by an examination of the language and the authorities quoted in it. Dr. PETER HAWORTH, Lecturer of English in this University, has kindly examined the *Ordinall* and he reports as follows :

In my opinion the poem entitled *The Ordinall of Alchimy*, judged by the pronunciation of the words, by the grammar, syntax and versification, certainly belongs to the second half of the fifteenth century. I think the final couplet on p. 106 is a statement of plain fact :

> " In this yeare of Christ One thousand foure Hundred seaventy
> and seaven,
> This Warke was begun, Honour to God in Heaven."

The evidence seems to me quite conclusive and can be found on every page.

Pronunciation. The unstressed *e* which is silent in Modern English must constantly be pronounced in the *Ordinall* for the sake of the metre :

> " With *greatë* Patience thei doe proceede,
> Trusting only in God to be their speede." (p. 17)

(41) MAIER, *Symbola Aureae Mensae*... p. 467, Francofurti (1617), refers to the author of the *Ordinall* as " *in arte perfectus magister*."

(42) Attention must be drawn to KOPP's statement : " cursirte unter seinem Namen." KOPP apparently did not accept THOMAS NORTON's authorship.

(43) The Latin title of the *Ordinall* is *Crede mihi seu Ordinale* and not as given by KOPP and reproduced by BROWN, *A History of Chemistry*... 2nd. ed. p. 105. London (1920). The error was subsequently corrected by KOPP, *Die Alchemie*... i, p. 214, Heidelberg (1886).

(44) STILLMAN, *The Story of Early Chemistry*. p. 297, New York and London (1924). This summary is typical of STILLMAN, who often expresses much in a crisp sentence.

" The Monke *saidë* how that he had in fire,
A thing which *shuldë* fulfill his desire." (p. 25)

Grammar. The medieval past participle must frequently replace the modernised form in the text to make up the verse; e.g.

" And Causeth his minde to be on him (y-) sett," (p. 17)
" For above erth rust in them is (y-) found;" (p. 18).

The present indicative plural ending in -n shows the Midland 15th century dialect :

" Also all men perceyven that be wise," (p. 19).

Syntax. It is necessary to supply the archaic relative " the which " to complete the verse :

(The) " Which be coppied in many a place
Whereby hath beene made *palë* many a Face; " (p. 8).

Lastly, the versification exactly resembles that of the English Chaucerians who wrote in the fifteenth century.

These conclusions are borne out by the following list, made by us, of authors (45), alchemists and other persons and works mentioned in the *Ordinall*.

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(45) The M.S. 18 B, xxiv, in the British Museum gives on Fol. 139 a list of " Authors Recited in this Booke," in which the name of RIPLEY is given. There is no mention of RIPLEY in ASHMOLE's version of the *Ordinall*. This inclusion of him is interesting, since it is believed by many authorities that RIPLEY is the master referred to on p. 33 of ASHMOLE's edition :

" This *Letter* receiving, I hasted full sore,
To ride to my *Master* an hundred miles and more;
And there Forty dayes continually,
I learned all the secreats of *Alkimy*..."

Other references to " my *Master* " occur on pp. 32, 34, 72, 88, 89 and 96; WAITE, *Lives of Alchemystical Philosophers*... p. 130, London (1888), writes : " ... and in the brief space of forty days, he is recorded to have mastered ' the perfection of chymistry,' obtaining his knowledge from a contemporary adept, who appears to have been Ripley himself." A much earlier writer, who calls himself " A Lover of Philalethes," states however in his *A Short Enquiry Concerning the Hermetick Art*... p. 34, London (1714) : " I have mentioned *Norton* the more, because it appears to me, that he, and his Contemporary *Ripley*, have written very Learnedly of this Art, and wonderful Agreeingly, though both writ near the same time, and very probably the one in *England*, and the other *abroad*; and, for ought I can meet with, were not known to one another at that time. Nor

ALBERT or ALBERTUS MAGNUS, pp. 48, 58, 59, 89, 96, King ALCHIMUS, p. 21 (46), ANAXAGORAS, pp. 8, 40, 47, 58, 63, 67, 84, 105 (47), ARISTEUS, p. 76 (48), ARISTOTLE, pp. 8, 55, 67, 77, 89, ARNOLD or ARNOLDUS, pp. 40, 44, 45, 46 (49), *Arte Generall*, pp. 57, 60, AVICEN, pp. 8, 46, BACON, pp. 8, 26, 45, 58, 60, 89,

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can one suppose that *Norton* had seen *Ripley's Compound of Alchimy;* since it was written but Six Years before his *Ordinal*. Books, *of that kind especially*, did not in those days come abroad quickly : Nor doth *Norton*, when he reckons up some that had written excellently of *Proportion*, take any Notice of *Ripley*, who, beyond all question, hath in that excell'd."; see also UNDERHILL, *Mysticism*... p. 503, London (1930), where reference is made to a reprint of *A Short Enquiry Concerning the Hermetick Art* (1894); according to BLACK,... *Catalogue of the Manuscripts*... col. 94, Oxford (1845), to M.S. 57 " Dr. DEE hath subjoined an Index of the names of 35 ' Authors recitede in this booke'," which we have not seen; see also D.W. SINGER, *Catalogue of ... Alchemical Manuscripts* ... iii, p. 990, Brussels (1931) : « Thomas Norton, *M.P. for Bristol. Studied under George Ripley* (*fl.* 1477). »

(46) King ALCHIMUS is here given as having preceded HERMES :

" This *Science* beareth her name of a King,
Called *Alchimus*, without leasing...
He searched *Nature*, he was nobil *Clerke*...
King *Hermes* alsoe he did the same..."

With reference to King ALCHIMUS see KOPP, *Beiträge zur Geschichte der Chemie*, i, p. 80, Braunschweig (1869).

(47) BORRELL, *Bibliotheca Chimica*... p. 11, Parisiis (1654), states : "Anaxagoras, in Turbam Philosophorum latina citatus, & in lib. 4. Anonimi de Massa Solis & Lunae. Anaxagorae conuersiones. M.S. in Anglia." KOPP, *Die Alchemie*... ii, pp. 208-220, Heidelberg (1886), seems rightly or wrongly to connect ANAXAGORAS with NAXAGORAS; see also FERGUSON, *Bibliotheca Chemica*... ii, p. 130, Glasgow (1906).

(48) According to BORELL, *Bibliotheca Chimica*... p. 28, Parisiis (1654) : " Aristaeus, Chimicus est, ex Turba & Paschalis Bibliotheca." He wrote *Verba Aristei Patris ad Filium*, see FERGUSON, *Bibliotheca Chemica*... i, p. 41, Glasgow (1906), from which KOPP, *Die Alchemie*... i, p. 96. Heidelberg (1886), quotes :

" Quid mihi divitiae, languore consorte?
Quid thesauri proderunt, si opprimar morte? "

KOPP, in a footnote, adds : " Über die Existenz bez.-w. die Zeit oder die Lebenverhältnisse dieses Aristaeus... weiss ich Nichts." He points out that ARISTEUS, given by MANGET, *Bibliotheca Chemica Curiosa*... i, p. 445, Coloniae Allobrogum (1702), is a spelling error for ARISLEUS; RUSKA, *Turba Philosophorum*... p. 23, Berlin, (1931), states : "Der Name lautet in allen alten Drucken und Handschriften ARISLEUS; damit erübrigt sich jede Sammlung von Varianten wie ARISTEUS, ARISTENES u. dgl. Gemeint ist ARCHELAOS, der Schüler des ANAXAGORAS."

(49) Probably ARNOLDUS DE VILLANOVA. BORRELL, *Bibliotheca Chimica*... p. 32, Parisiis (1654), gives ARNOLDUS GRAECUS; it may be this ARNOLD and not ARNOLDUS DE VILLANOVA.

BOETIUS, p. 60 (50), Boke *de Arbore*, p. 59 (51), booke of *Meeter*, p. 59, Boke of the Philosophers feast, p. 30, Boke of *Receipts*, p. 24, Boke of *Secrets*, p. 77, Boke of a *thousand receipts*, p. 8, BRIAN, p. 39, BRISE, p. 52 (52), CHANNON OF LICHFIELDE, p. 36, *Channons Yeomans Taile*, p. 42, CHAUCER, p. 42, *Conversions naturall*, pp. 8, 67, THOMAS DAULTION, pp. 35, 36, 37, DELUIS, pp. 35, 36, 38, *De Mineralibus*, pp. 59, 96, DEMOCRIT, pp. 8, 40, 77, 78, KING EDWARD, pp. 35, 36, 37, 38, Expositor of HERMES and ARISTOTLE joynte, p. 89, GEBAR, GEBER or GEBERUS, pp. 8, 44, 103, THOMAS HARBERT or HERBERT, pp. 35, 37, 38, HERMES, pp. 8, 21, 44, 68, 78, 89, 90, HOLTON, p. 39, HORTOLAN, pp. 8, 54 (53), ISAAC, p. 75 (54), KING KALID, p. 53, GILBERT KYMER, p. 57 (55), *Laudabile Sanctum*, p. 90, RAYMOND LULLY, RAIMOND

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(50) BORRELL, *Bibliotheca Chimica*... p. 49, Parisiis (1654) : " Anselmus Boëtius à Boodt, de lapidibus & Gemmis... describit." JÖCHER, *Allgemeines Gelehrten Lexicon*... i, col. 1245, Leipzig (1750), states that ANSELMUS BOËTIUS " schrieb... 1609 *historiam de gemmis & lapidibus*." This may be therefore a later introduction into the *Ordinall*.

(51) According to KOPP, *Die Alchemie*... ii, p. 378, Heidelberg (1886), a book by RIPLEY : " nur in Handschrift in der Bodleyanischen Bibliothek zu Oxford befindlich, nicht Jedem zu betrachten gegönnt..."; not in BLACK,... *Catalogue of the Manuscripts bequeathed unto the University of Oxford by Elias Ashmole*... Oxford (1845).

(52) WAITE, *The Secret Tradition in Alchemy*... p. 211, London (1926), refers to him as " Briseus the money-changer."

(53) BORRELL, *Bibliotheca Chimica*... p. 120, Parisiis (1654) : " Hortulanus, in Tabulum Hermetis Smaragdinam "; see also FERGUSON, *Bibliotheca Chemica*... i, pp. 419, 421, Glasgow (1906), where dates are discussed in connection with HORTULANUS varying from the latter half of the twelfth century to the middle of the fourteenth. According to JÖCHER, *Allgemeines Gelehrten Lexicon*... ii, col. 863, Leipzig (1750), HORTULANUS lived in the eleventh century. JÖCHER identifies him with DE GARLANDIA, or GARLANDRIA, " ein englischer Grammaticus, Chymicus, Mathematicus, Poet und Theologus." DAVIS, " The Emerald Table of Hermes Trismegistus," *Jour. Chemical Education*, iii, p. 864 (1926), doubts however the identity of JOHN GARLAND (1202-1253) with HORTULANUS.

(54) SCHMIEDER, *Geschichte der Alchemie*, p. 210, Halle (1832), under " Alchemie des fuenfzehnten Jahrhundertes, erste Haelfte," writes : " In das erste Viertel dieses Jahrhundertes setzt man die niederlaendischen Alchemisten *Isaak* und *Johann Isaak*... unter den Namen ISAACUS HOLLANDUS and J. I. HOLLANDUS angefuehrt..." This is, however, contested by other writers who think that they lived much later, see FERGUSON, *Bibliotheca Chemica*... i, p. 414, Glasgow (1906).

(55) The Latin versions give RYMERUS and not KYMERUS, see, for example, MANGET, *Bibliotheca Chemica Curiosa*... ii, p. 298, Genevae (1702). In ANONYMI PHILALETHAE, *Opera omnia*, p. 136, Mutinae (1695), reference is made to IOANNES RYMERUS but not to GILBERTUS RYMERUS.

or RAYMOND, pp. 8, 21, 26, 57, 58, 60, 62, 63, MARIA or MARIA Sister of ARON, pp. 87, 90, MERLIN, p. 8, MORIEN, pp. 8, 53, 61, PANDULPHUS, p. 90 (56), *Phisicks*, p. 55, PITHAGORAS, pp. 77, 78 (57), PLATO, pp. 42, 77 (58), *Porta*, p. 46, *Quadripartite*, p. 21, RASIS, pp. 8, 44, 46, RUPISCISSA, pp. 77, 78 (59), TONSILE, pp. 39, 40, 41, 42, 43, *Turba*, pp. 76, 90.

With the establishment of the fact that the *Ordinall* is correctly dated 1477 by its anonymous author we are in the position to evaluate the descriptions of THOMAS NORTON, some of which even amount to detailed biographies :

I. The M.S. *Ashm.* 1445, ii, is described as " Sir THOMAS NORTON's Ordinal (of Alchemy.) " and is a copy from a M.S. which had " belonged to ' Miles Blomefeld,' who had written his name on a scroll, over the beginning of every chapter, and inserted his initials in various places " (60). ASHMOLE (61), who has seen the original M.S., concluded at first that MYLES was " perhaps some *Brother* or *Kinsman* to our *William Bloomefield* " the author of " BLOOMEFIELDS BLOSSOMS : OR, *the Campe of* PHILOSOPHY " included in the *Theatrum Chemicum Britannicum*, pp. 305-323. " Neverthelesse by at Note in that *Booke* (of an indifferent antient hand) I afterwards found this *Myles* is called the *Author* of BLOOMEFIELDS BLOSSOMES."

BLOOMFIELD was an alchemist of some repute who lived early in the sixteenth century (62) and he may thus have had some

(56) BORRELL, *Bibliotheca Chimica*... p. 175, Parisiis (1654) : " Pandophilus, idem vt credo cum praecedenti, vt & pandulphus, & Pantophilus, prior in turba, posterior apud Seniorum memorati."

(57) BORRELL, *Bibliotheca Chimica*... p. 191, Parisiis (1654) : " Pythagoras, in turba Philosophorum."

(58) KOPP, *Beiträge zur Geschichte der Chemie*, i, p. 358, Braunschweig (1869) and *Die Alchemie*... ii, pp. 219, 305, 371, Heidelberg (1886).

(59) For the life of JEAN DE ROQUETAILLADE, better known as JOANNES RUPESCISSA, who lived in the fourteenth century, see FERGUSON, *Bibliotheca Chemica*... ii, p. 305, Glasgow (1906).

(60) BLACK, ... *Catalogue of the Manuscripts*... Col. 1211, Oxford (1845).

(61) ASHMOLE. *Theatrum Chemicum Britannicum*... p. 478, London (1652).

(62) BORRELL, *Bibliotheca Chimica*... p. 48, Parisiis (1654) : " Blomfeldi Flores Alchimiae Carmin. Angl. M.S. in Anglia extat " (two years after it had been published by ASHMOLE !); MANGET, *Bibliotheca Chemica Curiosa*... i, p. 46, Coloniae Allobrogum (1702); GMELIN, *Geschichte der Chemie*... i, p. 310, Göttingen (1797); FRANCIS BARRETT, *The Lives of the Adepts*... p. 301, London (1814); HOEFER, *Histoire de la Chimie*, 2me éd. ii, p. 130, Paris (1869); KOPP, *Die Alchemie*... ii,

direct information of the author of the *Ordinall*. This probably first hand description of the author as *Sir* THOMAS NORTON is of importance since of the Bristol NORTONS, who are supposed to have produced the author of the *Ordinall*, the first to be knighted was GEORGE NORTON, who married ELIZABETH, the daughter of the MARQUESS OF DORSET, and was made a K.C.B. as late as the 20th February 1547 (63).

It is possible that this description has given rise to the following observations by ASHMOLE (64) : " In the time of *Hen* 8. there flourished Nyne Brothers of the family of the *Nortons* and all *Knights*, one of them (viz.) *Sir Sampson Norton*... lyes buried in *Fulham Church* nere *London*, whose *Tombe* was adorned with severall *Hermeticke*, *Hierogliphicall* paintings... Whych Sir *Sampson* decessyd the eyghth day of February one thousand five hundred and seventeen."

FRANCIS BARRETT (65) writes with reference to THOMAS NORTON : " His family lived in high respect under King Henry VIII. There were nine brothers of the name of Norton, all of them knights." This was simplified by WAITE (66) to : " ... his family appears to have been held in high repute under King Henry VIII. There were nine brothers of the name of Norton." WAITE probably realised the difficulty of fitting *Sir* THOMAS NORTON into the Bristol NORTONS.

II. According to DALLAWAY (67) the *Ordinall* was written by THOMAS NORTON, a Bristol priest. DALLAWAY gives no authority for his statement and as far as we are aware this is the only reference where THOMAS NORTON has been described as a priest.

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p. 377, Heidelberg (1886); BOLTON, *A Select Bibliography of Chemistry*... pp. 952, 963, Washington (1893); WAITE, *The Secret Tradition in Alchemy*... p. 214, London (1926).

(63) SIMPSON, " St. Peter's Hospital, Bristol," *Trans. Bristol and Glouc. Arch. Soc.*, xlviii, p. 207 (1926).

(64) ASHMOLE, *Theatrum Chemicum Britannicum*... p. 438, London (1652). For Sir SAMPSON's epitaph, see WEEVER, *Ancient Fvnerall Monvments within the vnited Monarchie of Great Britaine*,... p. 526, London (1631).

(65) FRANCIS BARRETT, *The Lives of the Adepts*... p. 45, London (1812).

(66) WAITE, *Lives of Alchemystical Philosophers*... p. 132, London (1888).

(67) DALLAWAY, *Antiquities of Bristow in the Middle Centuries*... p. 210, Bristol (1834). DALLAWAY says that NORTON " finished his M.S. in 1477," but there is nothing novel in this statement; see ASHMOLE, *Theatrum Chemicum Britannicum*... p. 455, London (1652).

III. The author of the *Ordinall* has been identified with the master mason NORTON (68) employed by WILLIAM CANYNGES in rebuilding the church of St. Mary, Radcliffe, at Bristol in 1446. The evidence is very slight. It is not even known with certainty that the master mason in question was called NORTON, far less THOMAS NORTON, and the whole theory is deduced from the following quotation from the *Ordinall* :

> " I made also the *Elixeir* of life,
> Which me bereft a Merchaunt's wife..." (p. 34).

The " Merchaunt's wife " in question was supposed to be the wife of WILLIAM CANYNGES. WAITE (69) seems to favour this story and he points out that CANYNGES " suddenly started into great wealth, and... built the splendid and lofty steeple of St. Mary's, Radcliffe, besides enlarging Westbury College." This is a misapprehension, however. The wealth of CANYNGES was not " sudden," as is evident from the history of St. Mary's Church alone, with which the name of CANYNGES is associated in connection with benefactions as far back as 1376 (70).

The *Tripus Aureus*... shows the three authors on the titlepage reproduced by us on Plate I. Whereas BASIL VALENTINE and CREMER are depicted as a monk and as an abbot respectively, NORTON is only shown in the garb of a " philosopher." It is possible that MICHAEL MAIER wished to show NORTON in this nondescript dress and thus avoid committing himself to any definite version.

STOLCENBERG (71) has reproduced this picture with the following description (72) :

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(68) DALLAWAY, *Antiquities of Bristow in the Middle Centuries* ... pp. 202, 207, Bristol (1834). DALLAWAY, in his reproduction (pp. 16-166) of *Itinerarium sive Liber Rerum Memorabilium WILLELMI BOTONER Dict. de Worcestre* (WILLIAM WYRCESTRE), quotes, p. 133 : " ... per relacionem Norton *magistri* ecclesiae de Radclyff », and translates « magister » in a footnote as « master mason »; see also FERGUSON, *Bibliotheca Chemica*... ii, p. 145, Glasgow (1906).

(69) WAITE, *Lives of Alchemystical Philosophers*... p. 131, London (1888); see also ASHMOLE, *Theatrum Chemicum Britannicum*... p. 441, London (1652).

(70) WILLIAM BARRETT, *The History and Antiquities of the City of Bristol*... p. 569, Bristol (1789).

(71) STOLC DE STOLCENBERG, *Viridarium Chymicum*... p. E2, Francofurti (1624).

(72) A German translation is given by MEISSNER, *Chymisches Lustgaertlein*...

" TRES LAPIDIS PHILOSOPHICI
Possessores.

ector amande vides tres divitis Artis alumnos
Qui lapidem studijs obtinuêre suis.
'remerus medio, Nortonus at ipse sinistro,
Basilius dextro cernitur ecce loco.
forum scripta legas, Vulcaniaque arma requiras,
Qui cupis Hesperij carpere poma soli."

CRAVEN (73) describes the titlepage of the *Tripus Aureus*... as follows : " A double illustration of, on the one side, a library, with the three authors in conversation, the abbot in the middle, holding a pastoral staff; on the other half, a laboratory..."

IV. We come now to the most favoured version, namely, that the author of the *Ordinall* belonged to the Bristol NORTONS who flourished during several centuries at Bristol. The M.S. *Sloane*, 1873, in the British Museum has a picture which is identical with the one that faces p. 50 in ASHMOLE's version of the *Ordinall*, reproduced by us on Plate III. According to Fol. 41 of this M.S. this picture shows : " The Author sitting, having before him a payre of golden balances and a pyle of weyghtes standing by him..." THOMAS NORTON is here shown as a " man of substance," to use the recent description of HOLMYARD (74) for the author of the *Ordinall*.

The family name NORTON and its older versions LE NORTON, NORTONE or NORTON' (the version used when the *Ordinall* was written, namely in 1477) has been connected with Bristol for centuries up to the present day and we find ADAM LE NORTON mentioned as far back as 1310 in connection with the " prisage of wines to be had in the week of Pentecost " (75). The place-

Franckfurt (1624) ed. GARUDA, p. 45, Leipzig (1925), and an English one by READ, " The Romance of the Philosopher's Stone," *Chemistry and Industry Review*, viii, p. 413 (1930).

(73) CRAVEN, *Count Michael Maier*... p. 94, Kirkwall (1910).

(74) HOLMYARD, " Thomas Norton, an Alchemist of Bristol," *Chemistry and Industry Review*, i, p. 575 (1923); see also the Introduction, p. iv, to the facsimile reproduction of *The Ordinall of Alchimy* by THOMAS NORTON of Bristoll, from *Theatrum Chemicum Britannicum* ... by ELIAS ASHMOLE, London (1928).

(75) BICKLEY, *The Little Red Book of Bristol*... i, p. 242, Bristol and London (1900). With reference to the prisage of wines etc. see WILLIAM BARRETT, *The History and Antiquities of the City of Bristol*... p. 381, Bristol (1789).

name NORTON is of still older standing and is given in 1084 as one of the manors held under WILLIAM THE CONQUEROR in the neighbourhood of Bristol (76). CHARLES II was, in 1651, in hiding with one of the NORTONS at Abbott's Leigh, not far from Bristol (77), which had become the residence of Sir GEORGE NORTON in 1549 (78).

References to the alchemist THOMAS NORTON are common in works on the history of Bristol. BARRETT (79) writes : " Thomas Norton, born at Bristow, is celebrated among the men of note in Edward 4th's. time. As an alchemist, he wrote some books in that art, and in chemistry; also a poem, mentioned by Wharton, in which he celebrates Mr. Canning. Fuller, in his Worthies, says of Thomas Norton, that ' He boasted himself to be so great a proficient in chemistry, that he learned it to perfection in 40 days, when he was 28 years old, and complaineth that a merchant's wife in Bristol stole from him the elixir of health, suspected to be the wife of William Cannings of Bristol, (cotemporary with Norton) who started up into such great wealth and so suddenly, the clearest evidence of their conjecture.' He quotes Theat. Chymic. of Elias Ashmole for this, p. 441, but the absurdity of this conjecture is too apparent. Of this T. Norton, see more annals 1477. Some say he ruined himself and friends who trusted him with their money, (not unusual with these enthusiastic alchymists) and died very poor in 1477."

BARRETT's reference " annals 1477 " is of particular interest in the light of the following statement by EVANS (80) : " A.D. 1446. Thomas Norton, the Bristol alchemist, died." BARRETT seems to have realised the difficulty of co-ordinating the time when THOMAS NORTON is supposed to have died (1446) with that when the *Ordinall* was written (1477) and it was probably his intention

(76) EVANS, *A Chronological Outline of the History of Bristol*... p. 32, Bristol (1825).

(77) EVANS, *A Chronological Outline of the History of Bristol*... p. 213 Bristol (1825).

(78) EVANS, *A Chronological Outline of the History of Bristol*... p. 142, Bristol (1825).

(79) WILLIAM BARRETT, *The History and Antiquities of the City of Bristol*... p. 625, Bristol (1789).

(80) EVANS, *A Chronological Outline of the History of Bristol*... p. 104, Bristol (1825).

to deal with these points in the final chapter of his book, entitled "Annales Bristolliae," where under 1477 no reference whatever is made to THOMAS NORTON (81). BARRETT either forgot to do so or was unable to substantiate his statement that THOMAS NORTON "died very poor in 1477." Similar manipulations are common; thus FRANCIS BARRETT (82) states that THOMAS NORTON "wrote in 1477," whereas WAITE (83), who more or less reprodûced BARRETT's book under a new title, writes: "Thomas Norton died in 1477."

EVANS (84) has several references to the NORTON family:

"1399. Thomas Norton, Esq., M. P. for Bristol this year, lived in St. Peter's Church-yard.

1422. A mint for coining established in Bristol, in the mansion late Norton's, St. Peter's Church-yard.

1446. Thomas Norton, the Bristol alchemist, died.

1478. This year Thomas Norton, esq., dwelling in St. Peter's church-yard, accused Mr. Mayor (William Spencer) of high treason... This Thomas Norton was ancestor of the Norton of Leigh-Court, the host of Charles II.

1549. ... Bishop Paul Bush surrendered to the King the manor of Abbot's Leigh... the King granted the reversion of it... to Sir George Norton..."

Most of these references are reproduced in the other histories of Bristol (85); they suffice to show the importance of the NORTONS in Bristol.

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(81) WILLIAM BARRETT, *The History and Antiquities of the City of Bristol*... p. 681, Bristol (1789).

(82) FRANCIS BARRETT, *The Lives of the Adepts*... p. 44, London (1814). BARRETT gives on p. 106 under "Alchemical Works": "Thomas NORTON, ordinall of alchemy, 4to. Lond. 1652" *without* reference to ASHMOLE, *Theatrum Chemicum Britannicum*... London (1652), thus producing the wrong impression that there was a separate edition of the *Ordinall*. This is also copied by WAITE, *Lives of Alchemystical Philosophers*... p. 295, London (1888): "Norton (Thomas)—Ordinall of Alchemy. 4to. Lond., 1652."

(83) WAITE, *Lives of Alchemystical Philosophers*... p. 112, London (1888).

(84) EVANS, *A Chronological Outline of the History of Bristol*... pp. 97, 100, 104, 114, 340, 142, Bristol (1825); according to private information for which we are indebted to Miss FRANCES M. PRICE, the date 1549 given by EVANS is incorrect and should be 1551.

(85) See, for example, NICHOLLS and TAYLOR, *Bristol Past and Present*, p. 135, Bristol (1881); ARROWSMITH's *Dictionary of Bristol*, p. 300, Bristol (1906).

Those writers who support the version that the author of the *Ordinall* was a man of substance associate him with the NORTONS of Bristol. PORTER (86) writes that THOMAS NORTON the " alchemist, was a native of Bristol... His father was doubtless the Thomas Norton, bailiff of Bristol in 1392, sheriff in 1401, mayor in 1413, and the ' mercator,' who represented the borough of Bristol in the parliaments of 1399, 1402, 1411, 1413, 1417, 1420, and 1421. The alchemist seems to have been returned for the borough in 1436. According to Samuel Norton... Thomas Norton was a member of Edward IV's privy chamber, was employed by the King on several embassies, and shared his troubles with him when he fled to Burgundy... Norton was also the author of a work, ' De Transmutatione Metallorum ' and of ' De Lapide Philosophorum,' in verse... In Walter Haddon's ' Poemata,' 1567, p. 82, are some verses ' In librum Alchymiae Thomae Nortoni Bristoliensis.' " With reference to SAMUEL NORTON, PORTER (87) states that he " was the son of Sir George Norton... (*d.* 1584), and was great-grandson of Thomas Norton (*fl.* 1477), of Bristol."

FERGUSON (88) writes : " The author of the *Ordinall* was the son of Thomas Norton, and was born at Bristol towards the end of the fourteenth century. He was member of Parliament for the borough of Bristol in 1436, member of privy chamber of Edward IV., acted on embassies and accompanied the King when he fled to Burgundy... Other works are ascribed to him, or bear his name : De transmutatione Metallorum; and De Lapide Philosophorum. They have not been printed." Writing of SAMUEL NORTON he states (89) that he " was the son of Sir George Norton and great-grandson of Thomas Norton... He was born in 1548, studied at St. John's College, Cambridge, and in 1584 succeeded to his father's estate of Abbots Leigh in Somerset. He occupied several public positions, and died about 1604."

HOLMYARD (90) states : " Among Ripley's disciples in the

(86) PORTER, *Dictionary of National Biography*... xli, p. 220, London (1895).

(87) PORTER, *Dictionary of National Biography*... xli, p. 220, London (1895).

(88) FERGUSON, *Bibliotheca Chemica*... ii, p. 145, Glasgow (1906).

(89) FERGUSON, *Bibliotheca Chemica*... ii, p. 144, Glasgow (1906).

(90) HOLMYARD in the Introduction to the facsimile reproduction of *The Ordinall of Alchimy*... pp. iv and vi, London (1928); see also HOLMYARD's article on " Thomas Norton, an Alchemist of Bristol," *Chemistry and Industry Review*, i, p. 575 (1923).

'Divine Science' was Thomas Norton. The Nortons were people of importance in Bristol, and lived in a large house on the site now occupied by St. Peter's Hospital in that city. Thomas Norton's father seems to have been sheriff in 1401, and mayor in 1413; he was also a member of Parliament for Bristol for many years. Thomas Norton himself was a privy councillor and probably a man of substance, deriving his wealth from commercial undertakings, the exact nature of which is no longer known... A taste for alchemy appears to have been inherited by Thomas Norton's great-grandson, Samuel, who was born in 1548 and lived at Abbot's Leigh, near Bristol..."

It will be realised that only those biographical notes in which THOMAS NORTON is associated with the Bristol NORTONS can really be tested; the other descriptions of the author of the *Ordinall* can only be accepted with the greatest reserve. They are entirely based on the MAIER-ASHMOLE hypothesis that the initial letters reveal the authorship of the *Ordinall*, which may or may not be the case.

The Corporation of Bristol possess in their Archives several valuable manuscript volumes : 1) *The Mayor's Register* or *Mayor's Kalendar*, begun by ROBERT RICART 450 years ago, 2) *The Great Orphan Book*, 3) *Register Book of Wills*, 4) *The Great Red Book* and 5) *The Little Red Book*. Of these, no. 1 has been published in full by the Camden Society (91), no. 2 and no. 3 have been abstracted by WADLEY (92) and no. 5 has been published in full by BICKLEY (93). *The Great Red Book* is now being prepared for publication by Dr. W. W. VEALE, Lecturer in Law in this University. We take this opportunity of thanking Dr. VEALE for the generous manner in which he has put his knowledge and information at our disposal. We have, with the aid of these works and also with the help of ADAMS's *Chronicle of Bristol* (94),

(91) RICART, *The Maire of Bristowe is Kalendar*, edited by L. T. SMITH, London (1872).

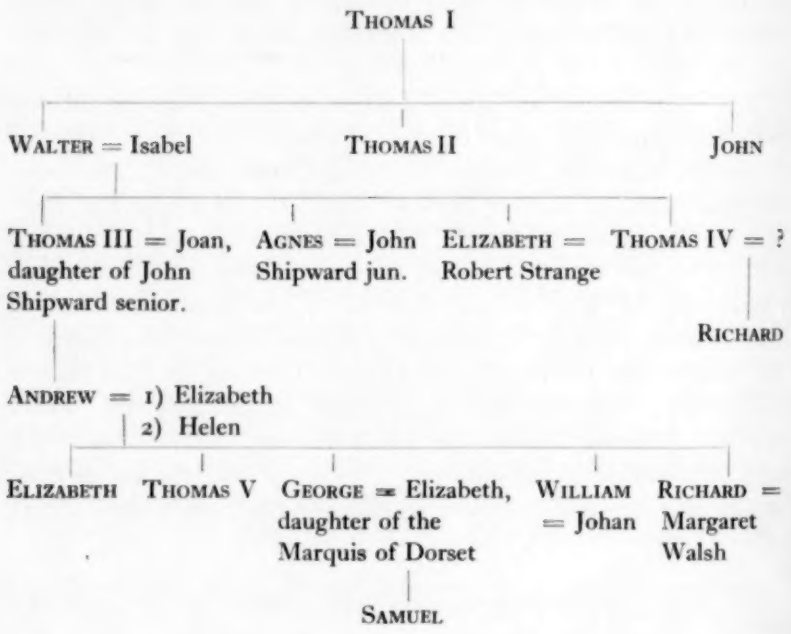
(92) WADLEY, *Notes or Abstracts of the Wills contained in the Volume entitled The Great Orphan Book and Book of Wills, In the Council House at Bristol*, Bristol (1886).

(93) BICKLEY, *The Little Red Book of Bristol*... 2 Vols., Bristol and London (1900).

(94) ADAMS's *Chronicle of Bristol*, from a M.S. commenced in 1623 and completed in 1648, ed. by F. F. FOX, Bristol (1910).

constructed a genealogical table of the Bristol NORTONS of the time directly concerned with the authorship of the *Ordinall*. To avoid all misunderstanding, we wish to point out that in compiling this table we were not intending to write the history of the NORTONS but that we only wished to establish the interrelationship of those members of the family called THOMAS. The history of Bristol has several other NORTONS, who may or may not be related to THOMAS NORTON I. We disregarded such NORTONS and only accepted those where the relationship is certain. The will of ROBERT SAUNDRES dates June 15th, 1391 (95) refers for example to a WILLIAM NORTON and also to a JOHN NORTON, both mentioned independently. Neither of them therefore was considered.

GENEALOGICAL TABLE OF THE NORTONS



We give below the following data referring to the four members of the NORTON family called THOMAS. THOMAS V may be disposed

(95) WADLEY, *Notes or Abstracts of the Wills...* p. 30, Bristol (1886).

of at once as his will (96) is dated 1619, showing that he lived long after the time of the *Ordinall*.

THOMAS NORTON I

We have not been able to ascertain the date when THOMAS I was born but the following dates arranged in chronological order give a fair account of him :

1388. Appointed executor in the will of JOHN MULEWARD (97) and mentioned in the will of EDITH MULEWARD (98).

1390. Legacies left to THOMAS I and his son THOMAS II in the will of ELIAS SPELLY, THOMAS I, the father, to be one of the executors (99).

1393. Bailiff of Bristol (100).

1396. Legacy left under the will of JOHN FOLYOT ("to Thomas Northton, burgess of Bristol ") (101).

1399. THOMAS NORTON sen. viz. I lives in the mansion at St. Peter's Churchyard (102), the property of JOHN CORNE (103). THOMAS I elected member of Parliament for Bristol (104).

1401. The mansion of St. Peter's Churchyard becomes the property of THOMAS I (105).

1402. THOMAS I sheriff (106) of and member of Parliament for Bristol (107).

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(96) SIMPSON, " St. Peter's Hospital, Bristol, " *Trans. Bristol and Glouc. Arch. Soc.*, xlviii, p. 207 (1926).

(97) WADLEY, *Notes or Abstracts of the Wills...* p. 18, Bristol (1886).

(98) WADLEY, *Notes or Abstracts of the Wills...* p. 19, Bristol (1886).

(99) WADLEY, *Notes or Abstracts of the Wills...* pp. 27, 28, Bristol (1886).

(100) RICART's *Kalendar*, ed. SMITH, p. 37, London (1872).

(101) WADLEY, *Notes or Abstracts of the Wills...* p. 51, Bristol (1886).

(102) EVANS, *A Chronological Outline of the History of Bristol*, p. 97, Bristol (1825).

(103) LATIMER, " Some Curious Incidents in Bristol History," *Trans. Bristol and Glouc. Arch. Soc.*, xxii, p. 272 (1899).

(104) *Return. Members of Parliament, Part I. Parliaments of England*, 1213-1702, p. 258, London (1878).

(105) LATIMER, " Some Curious Incidents...," *Trans. Brist. and Glouc. Arch. Soc.*, xxii, p. 272 (1899).

(106) RICART's *Kalendar*, ed. SMITH, p. 37, London (1872); WADLEY, *Notes or Abstracts of the Wills...* p. 59, Bristol (1886).

(107) *Return. Members of Parliament...* p. 263, London (1878).

1404. Memorandum of the delivery of a Statute Staple to JOHN DROYS by THOMAS I (108).

1409-10. THOMAS I one of the " forty-two good men elected by the Commonalty of the town of Bristol for the government of the same town" (109).

1411. Member of Parliament for Bristol (110).

1413. Member of Parliament for Bristol (111).

1414-1415. Mayor of Bristol (112). The wills of RICHARD SPALDYNG (113), SIMON CANYNGES (114), JULIANA RICHARDES (115) and JOHN SELY (116) proved before THOMAS I.

1417. Member of Parliament for Bristol (117).

1420. Member of Parliament for Bristol (118).

1421. Member of Parliament for Bristol (119).

These chronological notes give a fair picture of the activities of THOMAS NORTON I from 1388 to 1421. We have not been

(108) BICKLEY, *The Little Red Book of Bristol*... ii, p. 234, Bristol and London (1900). THOMAS I is here described as THOMAS NORTON, sen., which would suggest that THOMAS NORTON II was in 1404 a man of some standing in Bristol.

(109) BICKLEY, *The Little Red Book of Bristol*... i, p. 137, Bristol and London (1900). It was usual for relieved officers to serve in this way; thus the men elected in 1344 included ROGER TURTLE, ROBERTUS DE WRYNGTON and JOHANNES FRAUNCEYS, all former mayors of Bristol, see BICKLEY, *The Little Red Book of Bristol*... i, p. 25, Bristol and London (1900).

(110) *Return. Members of Parliament*... p. 276, London (1878).

(111) *Return. Members of Parliament*... p. 278, London (1878).

(112) RICART's *Kalendar*, ed. SMITH, p. 38, London (1872); BICKLEY, *The Little Red Book of Bristol*... ii, p. 223, Bristol and London (1900); WADLEY, *Notes or Abstracts of the Wills*... p. 87, Bristol (1886); BICKLEY, *loc. cit.*, ii, p. 216, states : " f. 183 b. Claims for freedom from tolls for citizens of Devizes, co. Wilts., made by Thomas Coventre, Mayor of Devizes, before Thomas Norton, Mayor of Bristol, and Walter Milton, senior, and William Westerley, Bailiffs; 4 July, 2 Hen. IV. (1401)." According to RICART, *loc. cit.*, p. 38, the " Ballivi," " Willelmus Westirley " and " Walterus Milton, sen." are given in the year 1414, when " Thomas Nortone " was Mayor. BICKLEY's statement 2 Hen. IV is therefore an error and ought to be 2 Hen. V (1415).

(113) WADLEY, *Notes or Abstracts of the Wills*... p. 90, Bristol (1886).

(114) WADLEY, *Notes or Abstracts of the Wills*... p. 90, Bristol (1886).

(115) WADLEY, *Notes or Abstracts of the Wills*... p. 93, Bristol (1886).

(116) WADLEY, *Notes or Abstracts of the Wills*... p. 92, Bristol (1886).

(117) *Return. Members of Parliament*... p. 289, London (1878).

(118) *Return. Members of Parliament*... p. 294, London (1878).

(119) *Return. Members of Parliament*... p. 297, London (1878). In all previous cases THOMAS I is described as THOMAS NORTON', mercator; in the Return for 1421, however, he is described as THOMAS NORTON', senior, mercator, which suggests that perhaps THOMAS II also stood for this election.

able to find a record as to when he died. SIMPSON (120) gives the date as 1434 or 1435, but unfortunately he quotes no authority for this statement.

The relationship between THOMAS I and his two sons WALTER and THOMAS II and the two sons THOMAS of WALTER is made clear from the wills of ELIAS SPELLY (121) and THOMAS ROGER (122). Reference also is made in the will of JOHN MULEWARD (123) to a son JOHN of THOMAS I.

With THOMAS NORTON I the name NORTON disappears from the civic life of Bristol (124). The identity of THOMAS NORTON I with the THOMAS NORTON referred to by the biographies as the father of the author of the *Ordinall* may thus be regarded as established. This would point to THOMAS NORTON II, who however was *not*, as also required by the biographies, the great-grandfather of SAMUEL NORTON, for the authorship of this work.

THOMAS NORTON II

1390. Legacy left to THOMAS II under the will of ELIAS SPELLY (125).
1435. Mansion in St. Peter's Churchyard in joint possession of THOMAS II and his brother WALTER (126).
1436. THOMAS II elected member of Parliament for Bristol (127).
1449. The will of THOMAS II, appointing JOHN GAMOND executor and legatee, proved and registered in the Library at Lambeth (128).

It is possible that THOMAS NORTON II was the famous alchemist

(120) SIMPSON, "St. Peter's Hospital, Bristol," *Trans. Bristol and Glouc. Arch. Soc.*, xlviii, p. 198 (1926).

(121) WADLEY, *Notes or Abstracts of the Wills...* p. 26, Bristol (1886).

(122) WADLEY, *Notes or Abstracts of the Wills...* p. 140, Bristol (1886).

(123) WADLEY, *Notes or Abstracts of the Wills...* p. 18, Bristol (1886).

(124) See RICART's Kalendar, ed. SMITH, London (1872), which ends with the year 1698, where no reference to any NORTON can be found after 1414.

(125) WADLEY, *Notes or Abstracts of the Wills...* p. 28, Bristol (1886).

(126) LATIMER, "Some Curious Incidents...," *Trans. Bristol and Glouc. Arch. Soc.*, xxii, p. 272 (1899); SIMPSON, "St. Peter's Hospital, Bristol," *Trans. Bristol and Glouc. Arch. Soc.*, xlviii, p. 198 (1926).

(127) *Return. Members of Parliament...* p. 329, London (1878). From 1422 until 1435 Bristol was not represented by any NORTON, see *Return. Members of Parliament...* pp. 302, 305, 308, 310, 313, 316, 318, 321, 324, 326.

(128) WADLEY, *Notes or Abstracts of the Wills...* p. 140, Bristol (1886); see also SIMPSON, "St. Peter's Hospital, Bristol," *Trans. Bristol and Glouc. Arch. Soc.*, xlviii, p. 198 (1926).

of Bristol who wrote *de transmut. metallorum, liber unus* and who " claruit anno 1447 " (129) and in whose honour was written GUALTERI HADDONI *Carmen, in laudem Thomae Nortoni* (130). That being so, EVANS (131), who states that " Thomas Norton, the Bristol alchemist, died " in 1446, was nearer to the truth than BARRETT (132) and WAITE (133), who say that he *died* in 1477. In any case, the fact that the will of THOMAS NORTON, son of THOMAS NORTON the elder, was proved in 1449, conclusively goes to show that he was certainly not the author of the *Ordinall* (134).

There remain therefore to be considered for the authorship of the *Ordinall* the two grandsons of THOMAS NORTON I, THOMAS III, the great-grandfather of SAMUEL NORTON, and his brother THOMAS IV. Before dealing with these two members of the NORTON family reference must be made to SAMUEL NORTON's statement that his great-grandfather had been a writer of alchemical works. This statement we have been able to trace to the M.S. *Ashmole* 1421, Fol. 171 v. (135). Thanks to the courtesy of the

(129) BORRELL, *Bibliotheca Chimica*... p. 168, Parisiis (1654).

(130) BLACK,... *Catalogue of the Manuscripts*... col. 717, 1211, 1302, Oxford (1845). The following is a copy :

" Maximus ingenio, scribendi maximus arte,
Thomas Nortonus, primarum semina rerum,
Atque metallorum venas tellure sepultas.
Eruit, ac imae subit intima viscera terrae.
Mellea secretos promit facundia sensus,
Atque vias omnes cudendi colligit auri,
Ars licet haec auri fontes opulenta recludat,
Attamen est auro longe pretiosior author."

(131) EVANS, *A Chronological Outline of the History of Bristol*... p. 104, Bristol (1825).

(132) WILLIAM BARRETT, *The History and Antiquities of the City of Bristol*... p. 625, Bristol (1789).

(133) WAITE, *Lives of Alchemystical Philosophers*... p. 132, London (1888).

(134) MATHEWS, *Historic Bristol*. A Series of Six Original Etchings by CHARLES BIRD... With Letterpress description... Bristol (1896), in his description of the " Court Room in the Norton Mansion," states : " The mansion was bequeathed in 1435 to Norton's two sons, Thomas and Walter. The first-named was living there in the year 1478, he having been identified by historians with the famous Thomas Norton, the Alchemist of that time, who was renowned as a philosopher and author of celebrity. In one of his books, the ' Ordinal,' he informs his readers amongst other things, that ' he learned Alchemy in forty days,'..."

(135) BLACK,... *Catalogue of the Manuscripts*... col. 1149. Oxford (1845) : " ' The Key of Alchimie ' in eight ' treatises,' by SAMUELL NORTON."

Bodleian Library, Oxford, who supplied us with a rotograph, we are in the position to publish the following transcript kindly made for us by Dr. PETER HAWORTH :

" ... the lay men which were favored of the kinge, one of them was a stranger borne in loraine, the other nighe the middest of England, the third of them was my great grandfather, him selfe beinge of his privie Chamber, diverse tymes an ambassador for him, and one also that with him felt such fortunes frownes (as the traiterous earle then drove the kinge unto, when he was forced to flye into burgonie) of whom I not a little wonder whi he would not imparte it to the kinge, and yet in his booke I finde thatt he was willinge therto, yf some great fault in the kinge had not letted it, for in his booke after a mourninge sort he sayth :

> Truly kinge Edward was nighe therto
> yf sinne had not lett him therfro
> But suerly sinne ioyntly with grace
> will not be together both in one place,

for further he addeth *Gratia tardatur, peccatum dum dominatur,* that is to say, Grace of consolation is defferred while sinne hath dominion :

Yett both in the begininge and endinge of his booke, he after a propheticall kind of manner, giveth out that this science shall happen to the kings of England, where his words are found to be on this wise :

> yett once this science as I understand
> shall greatly honour the Crowne of England
> when in this land shall Raine a kinge
> which shall love god above all thinge :

The latine verises in the begininge of his booke are to many and to longe to be recited, but that which I most of all dissier to come to passe, is that which he intimates in his sixt chapter wher speakinge of the stone to be revealed to the kings of this land..."

It will be seen from this transcript that SAMUEL NORTON makes no definite reference by name either to the *Ordinall* or to his great-grandfather as THOMAS NORTON. There is about SAMUEL NORTON's statements, it is true, a definite atmosphere suggestive of the *Ordinall*. There is a certain *similarity* about some of the

ideas which gives colour to the theory that SAMUEL NORTON may be rendering some of the passages in a very free translation. Thus the quotation "*Gratia tardatur, peccatum dum dominatur*" may well pass for a paraphrase of "Propter peccata tardantur *munera grata*" of the final line on page 2 of ASHMOLE's version. What appears to be the chief point of likeness, however, is where SAMUEL NORTON refers to "a stranger borne in loraine, the other nighe the middest of England, the third of them was my great grandfather." The *Ordinall* has it (p. 52) :

> "Of the *Dukedome* of *Loraine* one I understand
> Was borne, that other nigh the *Midle* of *England*.
> *Under a Crosse*, in the end of *Shires* three,
> The third was borne; the youngest of them is he."

It is again possible that SAMUEL NORTON is here referring to the father of either ELIZABETH or HELEN, the wives of ANDREW NORTON, his grandfather. There is unfortunately no record available as to who they were. All that we know is that they are buried with their husband ANDREW NORTON at the Church of St. Peter and St. Paul, Bristol (136).

On the other hand, in no case do we find SAMUEL NORTON reproducing the exact words of the *Ordinall*. Moreover, we cannot trace his references to King EDWARD, to "the endinge of his booke" or to his "sixt chapter." His observations do not lead with certainty to the identity of the *Ordinall* itself, much less therefore to that of its author.

THOMAS NORTON III (137)

THOMAS NORTON III, the son of WALTER NORTON of Bristol,

(136) WILLIAM BARRETT, *The History and Antiquities of the City of Bristol...* p. 519, Bristol (1789) describes their monument as follows : "In the middle aile on a large stone were three brass figures for Andrew Norton, Esq; and his wives Elizabeth and Helen, he died the 1st of Sept. 1527."

(137) SIMPSON, "St. Peter's Hospital, Bristol," *Trans. Bristol and Glouc. Arch. Soc.*, xlviii, p. 201 (1926), after referring to the accusation of the mayor of Bristol for treason by THOMAS NORTON III, writes : "This Thomas Norton was also notable as a skilful alchemist of the period. He obtained his knowledge from the greatest of the alchemists of that century, George Ripley." See also ARROWSMITH's *Dictionary of Bristol*, p. 300, Bristol (1906).

was Customer of Bristol (138) and we have been able to find no evidence that he had been a member of the privy chamber of EDWARD IV, that he had acted on embassies or accompanied the King to Burgundy when he fled in 1470 (139). All these statements are based on the evidence of SAMUEL NORTON, which has already been discussed.

The following dates are associated with THOMAS NORTON III :

1449. Legacy left to THOMAS III in the will of his uncle THOMAS II (140).

1458. WALTER NORTON applies for the transfer of his property to his younger son, THOMAS NORTON IV, " in order that he should not be vexed or troubled by Thomas, his elder brother," that is, THOMAS III (141).

1466. WALTER NORTON bequeaths to his elder son THOMAS III only a silver cup, some hangings and cushions in the hall of his dwelling and the standing bed in the great chamber with its tester and curtains (142).

1473. THOMAS III mentioned in the will of his father-in-law, JOHN SHIPWARD the elder (143).

1477. Pardon granted on December 3rd " to Thomas Croftes and Thomas Norton, collectors of the customs and subsidies in the port of Bristol... of all offences committed by them and all fines... due from them to the king " (144).

1479. THOMAS III accuses the mayor of Bristol, WILLIAM SPENCER, of high treason (145).

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(138) LATIMER, " Some Curious Incidents...," *Trans. Bristol and Glouc. Arch. Soc.*, xxii, p. 272 (1899); in the document referring to the accusation of the mayor of Bristol THOMAS NORTON III is described as a " gent. and water holder " and described as " of the King's household "; see LATIMER, " Some Curious Incidents...," *Trans. Bristol and Glouc. Arch. Soc.*, xxii, p. 276 (1899).

(139) FERGUSON, *Bibliotheca Chemica...* ii, p. 145, Glasgow (1906).

(140) LATIMER, " Some Curious Incidents...," *Trans. Bristol and Glouc. Arch. Soc.*, xxii, p. 273 (1899).

(141) SIMPSON, " St. Peter's Hospital, Bristol," *Trans. Bristol and Glouc. Arch. Soc.*, xlviii, p. 198 (1926).

(142) LATIMER, " Some Curious Incidents...," *Trans. Bristol and Glouch. Arch. Soc.*, xxii, p. 274 (1899).

(143) WADLEY, *Notes or Abstracts of the Wills...* pp. 160, 161, Bristol (1886).

(144) *Calendar of the Patent Rolls...* A.D. 1476-1485, pp. 22, 71, London (1901).

(145) LATIMER, " Some Curious Incidents...," *Trans. Bristol and Glouc. Arch. Soc.*, xxii, p. 276 (1899). The incident is referred to in the following works : ADAMS's *Chronicle of Bristol*, ed. F. F. FOX, p. 73, Bristol (1910); CORRY, *The History of Bristol...* i, p. 209, Bristol (1816); EVANS, *A Chronological Outline of the History of Bristol...* p. 114, Bristol (1825); ARROWSMITH's *Dictionary of*

1513. Will of THOMAS III dated 26th November (146).

The life of THOMAS NORTON III was full of " adventure " and one would scarcely venture to associate him with the authorship of the *Ordinall*. We have not been able to find any evidence in favour of such an assumption. The character given him by the Council of Bristol, that " he has retained riotous persons, is a common haunter of taverns, where he drinks and rails with his followers until midnight, not associating with honest company; lies in bed till nine or ten daily, avoiding divine service; spends sermon time in the afternoon at tennis and frivolous sports, and generally promotes mischief. Moreover, for divers years he unnaturally warred with and troubled his father and mother, who often gave him Christ's curse, and he has broken their wills since their death "; the incident with the mayor of Bristol, an act of revenge for having been discovered as the retainer of thieves who " assaulted the bailiff of Temple fee and left him for dead "; the manner in which he treated his younger brother, THOMAS NORTON IV, who was given " divers lands and tenements " by his father but whom THOMAS III put " out of the estate, vexed him with many actions, kept him a prisoner in the Savoy, and at last drove him out of the country to Spain, in the voyage to which he was drowned "; and the way in which he acted towards his father-in-law, JOHN SHIPWARD, when he " alleged he had authority to smite off " his head, and " threatened so to do unless Shipward would deliver up the deeds relating to his younger brother's lands; in dread whereof Shipward consented, and in his trouble died soon after "—are scarcely recommendation for the authorship of the *Ordinall* (147).

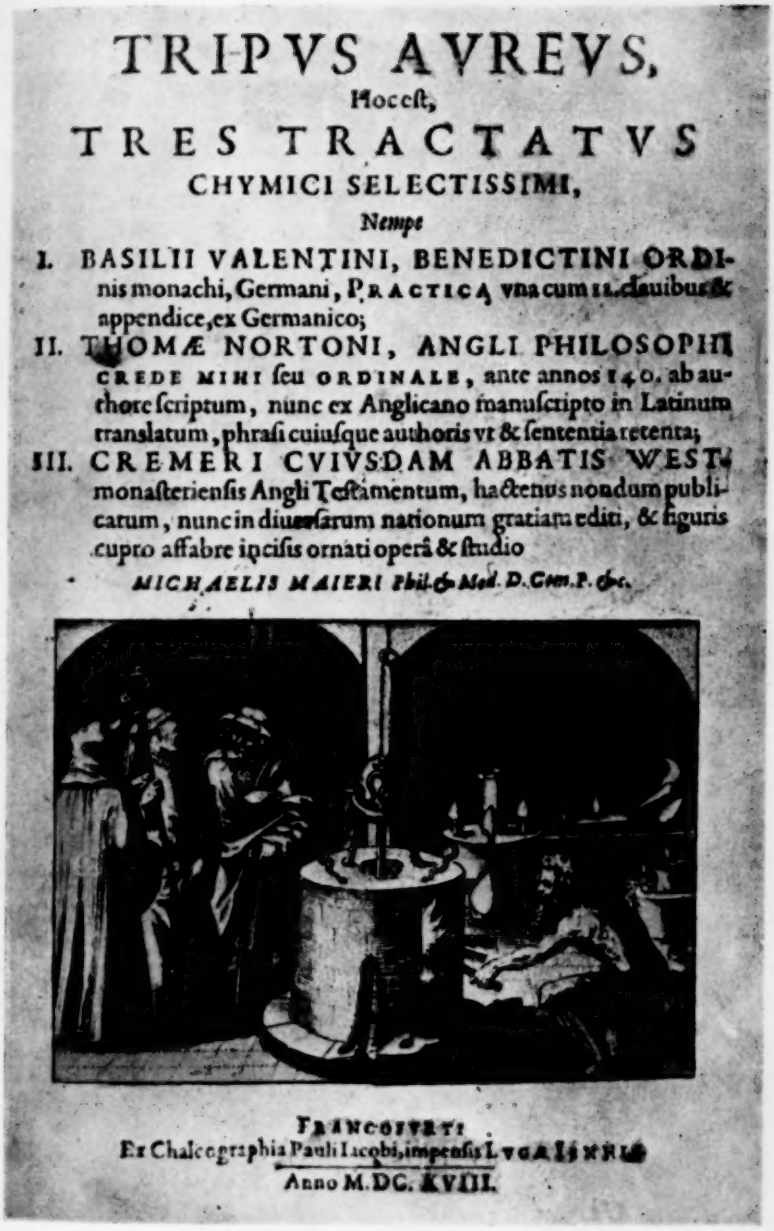
THOMAS NORTON III must have died soon after the 26th of November 1513, to judge from the tone of his will (148), in which

Bristol, p. 432, Bristol (1906). There is no reference to it in RICART's *Kalendar*, ed. SMITH and *The Little Red Book*... ed. BICKLEY. LATIMER's version (pp. 276-283) is taken from *The Great Red Book* and we are assured by Dr. W. W. VEALE that LATIMER has well paraphrased it.

(146) SIMPSON, " St. Peter's Hospital, Bristol," *Trans. Bristol and Glouc. Arch. Soc.*, xlviii, p. 206 (1926).

(147) All the quotations given by us are from LATIMER, " Some Curious Incidents...," *Trans. Bristol and Glouc. Arch. Soc.*, xxii, pp. 277-279 (1899).

(148) SIMPSON, " St. Peter's Hospital, Bristol," *Trans. Bristol and Glouc. Arch. Soc.*, xlviii, p. 206 (1926).


TRIPVS AVREVS,
Hoc eſt,
TRES TRACTATVS
CHYMICI SELECTISSIMI,
Nempe
I. BASILII VALENTINI, BENEDICTINI ORDINIS monachi, Germani, PRACTICA, vna cum 12. clauibus & appendice, ex Germanico;
II. THOMÆ NORTONI, ANGLI PHILOSOPHI CREDE MIHI ſeu ORDINALE, ante annos 140. ab authore ſcriptum, nunc ex Anglicano manuſcripto in Latinum translatum, phraſi cuiuſque authoris vt & ſententia retenta;
III. CREMERI CVIVSDAM ABBATIS WESTmonaſterienſis Angli Teſtamentum, hactenus nondum publicatum, nunc in diuerſarum nationum gratiam editi, & figuris cupro affabre inciſis ornati operâ & ſtudio
MICHAELIS MAIERI Phil. & Med. D. Com. P. &c.
FRANCOFVRTI
Ex Chalcographia Pauli Iacobi, impenſis L V C A E I S E N R I E
Anno M. DC. XVIII.

Titlepage of MICHAEL MAIER's *Tripus Aureus*...
depicting BASIL VALENTINE, CREMER and THOMAS NORTON.

Isis, XVIII, pl. 7. M. NIERENSTEIN; P. F. CHAPMAN

Titlepage of the *Ordinall* in MICHAEL MAIER's *Tripus Aureus*...

Isis, XVIII, pl. 8. M. NIERENSTEIN; P. F. CHAPMAN

Illustration depicting THOMAS NORTON
from ASHMOLE's *Theatrum Chemicum Britannicum*...

Isis, XVIII, pl. 9. M. NIERENSTEIN; P. F. CHAPMAN

THE
ORDINALL
OF
ALCHIMY.

VVritten by
THOMAS NORTON
OF
BRISTOLL.

Titlepage of the *Ordinall*
in ASHMOLE's *Theatrum Chemicum Britannicum*...

Isis, XVIII, pl. 10 M. NIERENSTEIN; P. F. CHAPMAN

he gives " To the gyldyng of thymage of St. Jamys at the High Auter of St. Peter's as much money as shall be necessary for performing of the same " (149), and charges his son ANDREW (150) to find a secular priest daily to sing for his soul, and the souls of his ancestors at the altar of St. George.

THOMAS NORTON IV

Of THOMAS NORTON IV little is known, as is evident from the following :

1449. THOMAS NORTON was probably not yet born, since in his will of this date THOMAS II refers to his brother's children as two daughters, ANNYS (AGNES) and ELIZABETH, and *one* son THOMAS, viz. THOMAS NORTON III (151).

1458. WALTER NORTON transfers his property to his younger son, THOMAS IV (152).

1467. THOMAS IV appears before the mayor, WILLIAM CANYNGES, and the sheriff, JOHN GAYWOODE, with reference to his father's property.

1479. In the Remembrance arising out of the accusation of the mayor, WILLIAM SPENCER, by THOMAS NORTON III, it is stated that the

(149) We have found no evidence that ANDREW NORTON, who is buried at the Church of St. Peter and St. Paul, see WILLIAM BARRETT, *The History and Antiquities of the City of Bristol*... p. 519, Bristol (1789), ever paid that money, which would suggest that " thymage of St. Jamys " did not require " gyldyng." For the benefactions to Bristol churches see WILLIAM BARRETT, *The History and Antiquities of the City of Bristol*... pp. 612-623, Bristol (1789), covering the period 1292 to 1779; also *The Bristol Charities*... 2 Vols., ed. THOMAS JOHN MANCHEE, Bristol (1831).

(150) For further information of ANDREW NORTON and his family see SIMPSON, " St. Peter's Hospital, Bristol," *Trans. Bristol and Glouc. Arch. Soc.*, xlviii, pp. 207-208 (1926).

(151) SIMPSON, " St. Peter's Hospital, Bristol," *Trans. Bristol and Glouc. Arch. Soc.*, xlviii, p. 198 (1926).

(152) LATIMER, " Some Curious Incidents...," *Trans. Bristol and Glouc. Arch. Soc.*, xxii, p. 273 (1899).

(153) LATIMER, " Some Curious Incidents...," *Trans. Bristol and Glouc. Arch. Soc.*, xxii, p. 274 (1899). LATIMER states that THOMAS NORTON IV was then still a minor, but we are informed by Dr. VEALE that this point is not made in *The Great Red Book*. LATIMER's suggestion that THOMAS IV was a minor in 1467 agrees however with SIMPSON's hypothesis that he was born after 1449.

latter drove his brother, THOMAS IV, " out of the country to Spain, in the voyage to which he was drowned " (154).

In addition to this information we find it also stated in 1479 that THOMAS NORTON III had agreed " by the mediation of Sir Richard Chok, justice, and the recorder... to pay a yearly rent to his brother's widow, and to provide a living for his nephew Richard," from which arrangement, however, THOMAS III withdrew " by his might and strength " (155).

THOMAS NORTON IV must thus have died some time before 1479 and there is no positive evidence to show that he was even alive in 1477 to *begin* the *Ordinall*. He might have been " Scantly of the age of twenty eight yeares " as required by it (p. 88, line 21), but this is not sufficient evidence to make him the author of the *Ordinall*.

It is evident from the foregoing that the " biographies " of THOMAS NORTON in which he is described as a member of the Bristol NORTONS are fundamentally incorrect, since it is impossible for any one NORTON to have been at the same time the son of THOMAS I and the great-grandfather of SAMUEL. Individually examined, we can say with certainty that THOMAS II did not write the *Ordinall*, since his will was proved in 1449. As to THOMAS NORTON IV, we know for certain that he was dead in 1479 and it is extremely unlikely that he was alive in 1477, when the *Ordinall* was begun. There remains therefore THOMAS III as a possible author of the *Ordinall*. As far as we have been able to ascertain, he has no credentials whatever for it, unless he was a hypocrite as well as a thoroughly disreputable character. Moreover, we have found no direct evidence to connect the *Ordinall* with either THOMAS III or THOMAS IV.

There is still, of course, the possibility that some other NORTON, from Bristol or elsewhere, knight, priest, master mason or " man of substance," may be found to fulfil the MAIER-ASHMOLE hypothesis, but meanwhile one can say with certainty that MAIER

(155) LATIMER, " Some Curious Incidents...," *Trans. Bristol and Glouc. Arch. Soc.*, xxii, p. 278 (1899).

(154) LATIMER, " Some Curious Incidents...," *Trans. Bristol and Glouc. Arch. Soc.*, xxii, p. 278 (1899).

and ASHMOLE were not justified in definitely ascribing the anonymously written *Ordinall* either to THOMAS NORTON, as shown on Plate I, the titlepage of MAIER's *Tripus Aureus*..., or to THOMAS NORTON OF BRISTOLL, as given on Plate IV, ASHMOLE's titlepage in the *Theatrum Chemicum Britannicum*...

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M. NIERENSTEIN.
P. F. CHAPMAN.

Die Sator-Arepo-Formel und ihre Erklärung

S A T O R
A R E P O
T E N E T
O P E R A
R O T A S

Diese "magische" Formel, ein echtes "Palindrom", kunstvoll erdacht und konstruirt, vorwärts und rückwärts, in horizontaler und vertikaler Richtung mit gleichem Ergebnis lesbar, ist seit dem frühen Mittelalter bekannt. Ein koptisches Papyrus-Amulett enthält schon diese Formel (ERMAN-KREBS, *Aus d. Papyr. der K. Museen*, Berlin 1899), die auch auf einem koptischen Scherben vorkommt (SÖKELAND, *Zeitschr. d. Vereins f. Volkskunde* 25. Jahrg. Berlin 1915) und in mittelalterlichen Handschriften, als Inschrift in Kirchen und als "Zauberspruch" gegen Feuerschäden, als "Wettersegen" und als magisches Mittel gegen Hundebisse und dergl. auf Tellern und Zetteln nicht selten ist. D a r ü b e r und über ältere, mehr oder weniger naive Erklärungsversuche berichten ältere Zusammenstellungen zur Genüge, eine kurze Literatur-Zusammenstellung bringt z. B. FR. DORNSEIFF "Das Alphabet in Mystik und Magie" Leipz. 1925, S. 79, und über das Vorkommen der Sator-Formel hat z. B. R. KÖHLER in der *Zeitschrift f. Ethnologie* Bd. 13, Berl. 1881, S. 301 ff. ausführlich berichtet.

N i c h t erwähnt ist bei DORNSEIFF eine Arbeit von ALBR. DIETERICH, ABC Denkmäler, Kleine Schriften Leipz.-Berl. 1911, S. 202 ff. (Rhein. Mus. LVI. 1901, S. 77 ff.), in der alle Bemühungen "einen Sinn in den Buchstaben (der Satorformel) suchen zu wollen", kurzweg als "Torheit" erledigt werden. "Sie (diese Buchstaben) haben niemals einen Sinn gehabt", meint

DIETERICH, "eine befriedigende Deutung gibt es eben überhaupt nicht", und : "In einem so komplizierten Zeichenspiel einen Sinn zu erwarten, heisst zuviel verlangen." Wir gestehen, dass uns diese Auffassung — auch ganz allgemein gesprochen — unverständlich ist, sind der Ansicht, dass scheinbar "Kompliziertes" sich oft als einfach und klar erweist und sind in diesem besonderen Falle der Meinung und Ueberzeugung, dass der Erfinder eines so kunstvollen Buchstaben-Gebildes, Zeit und Mühe nicht einer nutzlosen und sinnlosen Spielerei geopfert hat, sondern eine tiefe Wahrheit und Lehre in kürzester Form bieten, vielleicht auch mehr oder weniger versteckt einkleiden wollte. Die Tatsache, dass der Inhalt in der kunstvoll erdachten Form eines "Palindroms" einen von allen Seiten lesbaren Text ergibt, verlieh der "Sator-Formel" in den Augen Vieler den Charakter eines magischen Schutzmittels gegen böse Kräfte, — eines Amuletts. Ob dies von Anfang an beabsichtigt war, mag dahingestellt bleiben.

Auf Grund unserer Ueberzeugung von der Existenz eines sinnvollen Inhaltes der Formel, gingen wir an ihre genauere Untersuchung, an eine Analyse der W o r t e , und zwar zunächst einmal d e r Worte, die o f f e n, k l a r und d e u t l i c h gegeben sind, unter Verzicht auf Spielereien und scheinbar tiefgründige weithergeholte Erklärungsversuche, die oft das Vorhandene, Naheliegende nicht sehen.

Vorhanden sind vier klare Worte : Sator Tenet Opera Rotas, deren Bedeutung bisher merkwürdigerweise nicht erkannt worden ist. Zunächst ganz wörtlich, etwa : "Der Sämann hält mit seinem Schaffen die Räder".

Es bedarf keiner tiefgründigen Ueberlegung, um zu erkennen, dass "Sator" G o t t ist und dass mit "Rotas", den "Rädern" die Himmelskörper gemeint sind, Sonne, Mond und Sterne, der "Himmel", die "Himmels-Sphären".

Dies zu belegen ist keineswegs schwierig, da "Sator" ein wohlbekannter klassisch-lateinischer Ausdruck für Gottheit ist, so z. B. bei CICERO, der von Sator hominum deorumque spricht, ferner bei VERGIL *Aen.* I. 254 : hominum sator atque deorum, ebenso *Aen.* XI, 725. und *Georg.* I. 329. Aehnlich bei STATIUS. *Thebais*, I. 178, III. 218, und an anderen Stellen, deorum, terrarumque sator. TERTULLIAN spricht (*adv. Jud.* 2) von : deus gentium sator, LACTANTIUS, *Inst.* I. 23, 5, von : Saturnus, qui

sator omnium deorum fuit, (wobei vielleicht an einen Zusammenhang von Saturnus-serere gedacht wird). JUVENCUS, 3, 161 gebraucht den Ausdruck sator aeternae vitae im Hinblick auf CHRISTUS, und Ps.-AMBROSIUS in ähnlicher Weise : salutis humanae sator (Migne 17,1193). Ebenso nennt PAULINUS v. NOLA (*carm.* X, 50) CHRISTUS : mundi sator und schreibt *carm.* XIX, 307 : deus et cunctorum hominum sator. Als ein hervorragendes Beispiel für alle diese Stellen darf man wohl das homerische *πατὴρ ἀνδρῶν τε θεῶν τε Odyss.* 18. Ges. 137, ansehen.

Nicht weniger klar und nachweisbar wie die Bedeutung Sator= Gott, ist die von Rota für Sonne, Gestirn, Himmel.

So spricht TIBULL I. 9, 62 und ähnlich Vergil von rota luciferi, OVID. *Metam.* III. 150 von croceis rotis aurorae. Und bei LUCRETIUS CARUS, *De Rerum Natura*, VI. 551 :

> Hic neque tum solis rota cerni lumine largo
> altiuolens poterat nec magni sidera mundi

in der Wiedergabe von H. DIELS (Berl. 1923/24) :

Damals sah man noch nicht der Sonne leuchtenden Radkranz
Hoch in den Lüften sich drehn noch die Sterne im weiteren Weltraum.

Aehnlich spricht man ja auch heute noch bisweilen von Sonnenrad, Sonnenscheibe (*δίσκος*).

Die Vorstellung von leuchtenden, feurigen Scheiben, Rädern, am Himmel ist sehr alt, und ebenso d i e Vorstellung der gewaltigen Rundung des Himmels, der Himmels-Sphäre, etwa im Sinne der Stelle in Psalm 76 (77) 19, die von der Vulgata nach dem hebräischen "Galgal" mit den Worten wiedergegeben wird : " Vox tonitrui in rota " (galgal etwa wälzen, drehen) und von LUTHER etwas allgemein : "Es donnerte im Himmel".

Etwas enger umgrenzt kann, je nach den Umständen, "Rota" auch eine Bezeichnung für "Sonne" sein, wie ja auch in Babylonien das geflügelte Sonnenrad ein Emblem des "Königs der Götter" Assur war und in Aegypten das Bild der geflügelten Sonnenscheibe oft vorkommt.

Auf ältere, vielleicht babylonische, Gedanken und Vorbilder mag vielleicht auch die grossartige Vision himmlischer Grösse bei EZECHIEL 1 zurückgehen, mit der allerdings mehrdeutigen

Erwähnung von "Tieren" und "Rädern". Auch der Altindische Kulturkreis kennt die Vorstellung eines Himmelsrades, eines Weltrades, das auch das Symbol der Zeit-Kâla ist, des Ablaufs der Zeit, mit allem Guten und Bösen, das sie für den Menschen mit sich bringt :

"Weil ich in dieser Welt nur Vergängliches sehe, infolge des Gesetzes des Umschwungs der Zeit (Kâla), darum o Çakra, klage ich nicht, denn alles hienieden ist endlich". (*Adhyâya* 224. P. DEUSSEN, Vier Philosoph. Texte des Mahâbhâratam, Leipz. 1906. S. 293.) Auch an anderen Stellen der altindischen Schriften wird das in Raum und Zeit hinrollende Rad (bezw. der Wagen) der Welt und Zeit in enger Verbindung mit menschlichem Sein, Denken, Fühlen und Tun geschildert. Besonders z. B. *Adhyâya* 45, DEUSSEN a.a.O. S. 973.

Auch die altgriechiche Philosophie kennt ähnliche Vorstellungen; aber die Aehnlichkeit scheint doch nur eine zufällige, äussere zu sein, wenn bei ANAXIMANDER eine Erwähnung feuriger kosmischer Radkreise vorkommt. Denn h i e r handelt es sich um Gedanken über eine Art Kosmogonie, über die Bildung von Weltkörpern durch Aufnahme feuriger Ur-Energien.

Immer aber ist es die R o t a, das Sinnbild der mannigfaltigen, bewegten, ewig kreisenden, grossen, von der Urkraft-Sator der Gottheit geschaffenen und bewegten Welt. Gleichviel ob man an den "ersten Beweger", das aristotelische *τὸ πρῶτον κινοῦν* (*Meteorol.* XII. 7) denken will, oder an Gott als causa efficiens finalis et formalis (ALBERTUS MAGNUS, *Summa theologiae* II, 2), — immer können solche Gedanken in die drei kurzen Worte zusammengefasst werden : "Sator tenet Rotas", Gott, der Schöpfer, die Urkraft, regiert die Welt, begreift die Welt in sich, — die grosse Welt, den Makrokosmos. — Und den Mikrokosmos, den Menschen ?

Auch d a s ist in der Satorformel wohl ohne Zweifel gegeben,

T
E
und zwar in dem kreuzförmig erscheinenden TENET, das
E
T

viermal das Wort TE, D i c h, enthält.

Man wird die Satorformel also lesen können : *Sator tenet opera*

rotas et te, Gott, der Schöpfer begreift mit seinem Wirken die grosse Welt in sich und auch Dich.

Dem Sinne nach den ersten Versen des *Paradiso* DANTES entsprechend :

> La gloria di Colui che tutto move
> Per l'universo penetra, e risplende
> In una parte più, e meno altrove

bei denen man an ähnliche Worte bei BOETHIUS (*Consol. philos.* III. metr. 9) denken kann : "O qui perpetua mundum ratione gubernas Terrarum caelique s a t o r qui tempus ab aevo Ire jubes stabilisque manens dans cuncta moveri".

Aehnliches, mit der Verbindung von Gott, Welt und Weltordnung, wird von DANTE auch an anderen Stellen ausgesagt, etwa *Paradiso* I, 103 :

> E cominciò : « Le cose tutte quante
> Hann' ordine tra loro; e questo è forma
> Che l'universo a Dio fa simigliante.

Auch Wort und Begriff r o t a (modern Italian. ruota), für Sonne, Himmelskörper, Himmels-Sphäre, ist DANTE geläufig. Z. B. *Paradiso* I, 64 und 76 :

> Beatrice tutta nell' eterne rote
> Fissa con gli occhi stava...

In der bisherigen Betrachtung blieb das Wort "Arepo" unberücksichtigt, weil zunächst die klaren Worte der Formel besprochen werden sollten. Gerade dieses Wort „Arepo" machte früheren Erklärern besondere Schwierigkeiten und führte je nach Art und Veranlagung der Suchenden zu naiven oder auch gelehrten „Lösungen", die nicht selten mit Ausflügen in mehr oder weniger entlegene Sprachgebiete verbunden waren und den unbefangenen Betrachter sonderbar anmuten. Zunächst ist ja zu bedenken, dass "Arepo" weiter nichts ist, wie die — hier notwendige — Umkehrung von "opera", die mit der Umkehrung "Sator-Rotas" und dem umkehrbaren "Tenet", die "Palindrom"-Eigenschaft der Formel überhaupt erst ergibt. Da das Wort "Arepo" sich

also hier von selbst ergab und in der lateinischen Sprache—im Gegensatz zu den übrigen Worten der Formel— n i c h t existiert, bezw. keinen Sinn ergibt, so kann die Bedeutung von "Arepo" als Wort an sich wohl in negativem Sinne beurteilt werden. Sollte "Arepo" in irgend einer Sprache eine Bedeutung haben, die zudem dem Erfinder der Formel sehr wahrscheinlich unbekannt war, so würden wir das als etwas Zufälliges und Unerhebliches ansehen.

Etwas anderes ist es mit den versteckten Bedeutungen, die der Erfinder der Sator-Formel in dem Wort "Arepo" sehen konnte, — Bedeutungen, die im Wesen des Anagramms und deshalb auch im Sinne des Anagramm-Erfinders liegen und durch weitere Umstellungen des Wortes „Arepo" zu finden sind. Der Denkweise des ursprünglichen Autors der Formel, seiner Zeit, der Leser und etwaigen Benutzer der Formel, etwa als Amulett, werden solche Umstellungen sicher entsprochen haben, sodass auch w i r uns wohl auf solche Wege begeben dürfen. Dass es sich dabei, wie überhaupt bei der Erklärung der Formel, nicht um sprachliche und grammatikalische Feinheiten handelt, sondern um Buchstaben und Buchstabenfolgen, dürfte selbstverständlich sein.

Bei der weiteren Umstellung von O p e r a, also auch von A r e p o, ergibt sich zunächst die korrekte Verbalform p a r e o, ich erscheine, bin sichtbar, ich zeige mich, u. dergl., gleich appareo. Oder auch : ich gehorche, lasse mich leiten. Will man sich zu einer etwas weitherzigeren Auslegung bereit erklären, die bei einem Anagramm vielleicht möglich und erlaubt ist, so kann man dieses p a r e o auch als p a r i o lesen, mit der Bedeutung gebären, hervorbringen. Und da eine weitere Umstellung von o p e r a auch r a p e o ergibt, so liegt es nahe, für dieses nicht existierende Wort das korrekte und hier bedeutungsvolle r a p i o - dahinraffen einzusetzen.

Schliesslich war es für einen Anagramm-Erfinder vielleicht möglich und erlaubt, aus einer weiteren Umstellung von Opera, dem Buchstaben-Gebilde O r a p e, ein O r a - bete ! herauszulösen. Und dass S a t o r - R o t a s bei weiterer Umstellung auch das bedeutungsvolle Wort A s t r o - Gestirn ergibt, mochte damals ebenfalls nicht gleichgültig erscheinen !

Fassen wir das alles zusammen und entschliessen wir uns,

auch die weiteren, eben genannten Umstellungen zu akzeptieren, so kommen wir zu d i e s e r klaren und sinnvollen Deutung der Sator-Formel :

> Gott tritt durch sein Wirken in Erscheinung.
> Er erschafft und vernichtet,
> Er hält die Himmels-Sphären in seiner Hand (Makrokosmos)
> Und auch dich. (Mikrokosmos)
> Bete !

Wie oben gezeigt wurde, kann die Formel antik Philosophisches enthalten, das Aristotelische *πρῶτον κινοῦν*, und wenn man unserem Vorschlag "Pario" und "rapio" zustimmen will, auch die Begriffe der generatio und corruptio, des Werdens und Vergehens, bezw. des Erzeugens und Vernichtens.

Also eine Beteuerung der Grösse Gottes, der Natur, ein Trost und eine Aufmunterung für den Gläubigen zur Zuversicht, eine Erinnerung an das Werden und Vergehen, an das Vergängliche ! Das Ganze eingekleidet in das Gewand einer zauberhaften Palindrom-Formel, als Schutz gegen Feindseliges, Bedrohendes. Den älteren Benutzern der Formel wird der hier wiedergegebene Sinn, an dessen Richtigkeit wir nicht zweifeln, zunächst als Lobpreisung Gottes bekannt gewesen sein, sodass auch das ziemlich häufige Vorkommen in Kirchen sich erklärt. Dieser, in seiner Einfachheit grosse, sinnvolle Inhalt der Sator-Formel, steht über jeder Zeit, Nation und Religion, sodass auch das Vorkommen in so vielen Ländern und Gegenden begreiflich ist. Die Verwendung der Formel als Wettersegen, wie sie z. B. Ad. Franz, Die Kirchl. Benediktionen im Mittelalter, Freiburg 1909, II. 94 erwähnt, ist ebenfalls leicht verständlich, da sie ja mit der hier gegebenen Anrufung des Himmels-Beherrschers in Verbindung steht, vielleicht auch in Anlehnung an das oben citierte Bibelwort „Vox tonitrui in rota" ! Dass derartige Verwendungen als Wetter- und Feuer-Segen und für sonstige „magische" Zwecke das tatsächliche Verständnis des Inhaltes überlebten und sich in jeder Hinsicht dem Primitiven zuwandten, ist nicht auffallend, zumal die merkwürdige, zauberhafte Form auch des u n v e r s t a n d e n e n Palindrom-Spruches auf den Unwissenden mächtig einwirken und ihn zur vielfachen Verwendung führen konnte.

Auf einen anderen Punkt soll aber noch hingewiesen werden :

"Sator" kann auch der irdische Sämann sein und "rota" die Rota aratri, das Rad des Pfluges (vollkommenere Pflüge mit Rad kannte die Antike). Ohne Zweifel kann man auch lesen : "Der Sämann (Bauer) lenkt mit seiner Hand (seiner Arbeit) den Pflug und er hält auch dein Schicksal in der Hand." (Ernährung). Das Werden und Vergehen, von dem wir sprachen, der ewige Wechsel in der Natur, macht sich bei der Ackerbestellung besonders geltend. Es steht also wohl nichts im Wege, eine Parallele zwischen himmlischem und irdischem S a t o r in unserer Formel anzunehmen, eine gewollte Parallele, die nach unserer Meinung eine tiefere Gegenüberstellung von Makrokosmos und Mikrokosmos enthält, aber vielleicht und wahrscheinlich auch ein Gleichnis für das O b e r e und U n t e r e im hermetischen, alchemistischen Sinne, als Ausdruck für die Worte der Tabula Smaragdina :

Quod est inferius, est sicut quod est superius.

Vielleicht werden arabische (und griechische ?) Texte der Satorformel bekannt und bringen weitere Klärung ?

Wie ich sehe, erkennt auch KUNO Graf v. HARDENBERG in einem geistvollen Buche *Rosenkreuz und Bafomet* (Darmstadt 1932, Gesellschaft Hessisch. Bücherfreunde) im ersten Teile, der sich mit der Sator-Formel beschäftigt, und zwar in einer kurzen Zusammenfassung (S. 27), in der Formel das "Lebensgesetz der ewigen Rotation des Kosmos" und das Walten des Schöpfers, der als Erzeuger "aller Wesen auch ihre Ordnung und ihr Schicksal in den Händen hält", ohne jedoch dieses Grundlegende zu erklären oder weiter auszuführen. Die schönen aber etwas weitgehenden Auslegungen HARDENBERGS, der aus der Sator-Formel ein "Petro et reo patet rosa sarona" herausliest, und das "Zeichen des Kreuzes als letzte Weisheit", treffen vielleicht, wie uns scheint, mehr den Sinn denkbarer späterer Auffassungen, als die ursprüngliche einfache, grosse Bedeutung der Sator-Formel, die wir hier zu zeigen versuchen.

München. ERNST DARMSTAEDTER.

Notes and Correspondence

VII^e Congrès International des Sciences Historiques. — Section d'Histoire des Sciences et de la Médecine. (Troisième communiqué de la Commission Organisatrice). Conformément au communiqué précédent (voir *Isis*, 17, 421-423), la Commission Organisatrice donne avant tout quelques nouvelles informations d'ordre général sur l'organisation du VII^e Congrès International des Sciences Historiques (Varsovie, 21-28 août 1933). Elles sont tirées de la seconde circulaire qui vient d'être publiée par la Comité Organisateur et qu'on fera parvenir à toute personne qui la demandera au secrétaire général du Comité (M. THADÉE MANTEUFFEL, Université de Varsovie). Toutes les personnes qui désirent prendre part aux travaux du Congrès, sont priées de bien vouloir remplir le bulletin d'adhésion joint à ladite circulaire et de le renvoyer à l'adresse du secrétaire général. Les circulaires suivantes du Comité ne seront expédiées qu'à ceux qui auront envoyé leur bulletin d'adhésion. Il serait désirable que les adhésions soient envoyées au plus tôt, autant que possible avant le 1^er janvier 1933.

La cotisation au Congrès est fixée à quatre dollars américains (ou la somme correspondante en argent d'autres pays) pour les membres actifs et à deux dollars pour leur famille ou autres personnes accompagnants. Ces personnes bénéficieront, comme les membres actifs, des réductions de prix prévues pour les Congressistes, mais ce sont seulement les membres actifs qui recevront les résumés des communications. Les réductions en question porteront sur le tarif des visas, des chemins de fer en Pologne et probablement dans quelques autres pays, ainsi que des grandes lignes de navigation, etc. Les dispositions prises à ce sujet seront précisées ultérieurement. L'organisation des voyages et des séjours en Pologne pour le Congrès a été confiée à l'agence mondiale des voyages « Wagons-Lits-Cook », dont toutes les succursales pourront à partir du 1^er décembre 1932 fournir des informations pratiques.

Les Congressistes sont instamment priés de bien vouloir verser leur cotisation le plus tôt possible.

Comme il a été dit dans le communiqué précédent, les contributions à apporter au Congrès seront de trois espèces :

1° Les *rapports* seront publiés *in extenso* avant le Congrès par les soins du Comité International des Sciences historiques, dans le *Bulletin of the International Committee of Historical Sciences*. Ils ne peuvent dépasser 12 pages in-8° et doivent être envoyés dactylographiés et par courrier recommandé avant le 1er septembre 1932 au Secrétaire du C.I.S.H. (M. MICHEL LHÉRITIER, 9, rue du Printemps, Paris XVIIe). Ils ne seront pas lus au Congrès; leurs auteurs se contenteront d'en présenter un court résumé pour amorcer la discussion. Les Congressistes pourront obtenir pour un prix très modique les numéros du *Bulletin* où les rapports seront publiés.

2° Les résumés des *communications* seront publiés avant le Congrès par les soins du Comité Organisateur. Ils ne peuvent dépasser 4 pages in-8° et doivent être envoyés dactylographiés et par courrier recommandé avant le 1er mars 1933 à l'adresse de M. MANTEUFFEL, Secrétaire Général du Comité Organisateur (v. plus haut). Pour présenter sa communication au Congrès, chaque Congressiste disposera de 30 minutes au maximum.

3° Les *interventions* annoncées à l'avance pour la discussion des rapports et des communications seront mentionnées dans l'ordre du jour, mais ne seront publiées qu'après le Congrès dans le compte-rendu officiel. Elles ne peuvent durer que 5 minutes. Les interventions qui ne seraient pas annoncées à l'avance pourront être admises seulement suivant le temps dont on disposera.

Toutes les contributions au Congrès peuvent être présentées dans l'une des cinq langues suivantes : allemand, anglais, espagnol, français, italien. Le Comité Organisateur se réserve le droit de décider en dernier ressort de l'accueil à faire aux contributions qui lui seront annoncées.

Quant à la Section d'Histoire des Sciences et de la Médecine (qui est maintenant la dixième section du Congrès, étant donné la création d'une section spéciale pour l'histoire des idées et de la philosophie), le Comité Organisateur a décidé l'admission de tous les rapports et de toutes les communications dont les titres ont été publiés dans nos communiqués précédents. La liste des rapports et des communications annoncés à la Commission s'est augmentée en outre des titres suivants :

1° Commission des grands voyages et des grandes découvertes (E. DÉPREZ, président) : *Les progrès de l'astronomie nautique du XVe au XVIIIe siècle.*

2° A. DÉSI DADAY (Budapest) : *Uebersichtsreferat über die Entwicklung der Medizin in Ungarn.*

3° A. VON GORKA (Pécs) : *Uebersichtsreferat über die Entwicklung der beschreibenden Naturwissenschaften in Ungarn.*

4° Groupe Polonais de la Commission organisatrice de la Section : *Rapports sur l'histoire des sciences et de la médecine en Pologne.*

5° N. JORGA (Bucarest) : *L'histoire de l'enseignement scientifique en Roumanie.*

6° J. TUR (Varsovie) : *Les origines de la conception de l'homologie dans les sciences anatomiques.*

Le Comité International de l'Histoire des Sciences publiera pour le Congrès de Varsovie *Les tables chronologiques de l'histoire des sciences au XVI^e siècle*, sous la rédaction de M. ALDO MIELI. En outre, une commission spéciale de six membres a été nommée par le Comité avec la tâche de préparer et de publier en temps utile pour le Congrès de Varsovie un volume sur l'enseignement de l'histoire des sciences. La question du développement de cet enseignement dans les universités et les écoles supérieures, techniques et secondaires sera discutée pendant le Congrès, probablement dans une séance commune avec la Section XIV (Enseignement de l'Histoire). Il serait souhaitable de rédiger au Congrès de Varsovie un ordre du jour sur cette question, qui pût être présenté à tous les gouvernements par le Comité International d'Histoire des Sciences et par le Comité International des Sciences Historiques.

Dans sa réunion du 24 octobre 1931 la Commission a entendu la lecture de la lettre du 20 juin 1931, par laquelle M. V. L. BOLOGA a exprimé son désir d'être remplacé, au sein de la Commission, par M. P. SERGESCU (Cluj). On a décidé de donner suite à cette demande et de transmettre, en même temps, à M. BOLOGA les remerciements de la Commission pour le concours qu'il a accordé à l'organisation de la Section. En outre la Commission a jugé convenable de s'adjoindre MM. B. HRYNIEWIECKI (Varsovie) et T. WISNIOWSKI (Varsovie).

Varsovie-Cracovie, au mois d'avril 1932.

A. BIRKENMAJER, *secrétaire*. A. DICKSTEIN, *président*.

Personalia. — In order to increase the speed of publication, all the notes concerning the teaching of the History of Science, obituaries, commemorations, anniversaries, in short all the "news" should be addressed directly to the Managing Editor Mr L. GUINET, 11, place Général Meiser, Brussels, Belgium.

A la mémoire de Sadi-Carnot. — Au début de juillet a eu lieu, à Paris, en présence de M. A. LEBRUN, président de la République, l'inauguration d'une plaque commémorant la naissance, au Petit Luxembourg (hôtel de la présidence du Sénat) de SADI-CARNOT, qui découvrit le principe de CARNOT (*Isis*, 13, 24-26, 33-34, 44). Cette plaque de marbre porte le texte suivant : « Le 1^er juin 1796 naquit dans ce palais le fils

de LAZARE CARNOT, NICOLAS LÉONARD SADI-CARNOT, qui découvrit les principes de la thermodynamique, offrant ainsi à la science des voies entièrement nouvelles. Mort à Ivry le 24 août 1832 ».

L. S.

Le Centenaire de Georges Cuvier. — Le 13 juillet 1932 se sont déroulées à Montbéliard des cérémonies en l'honneur du centenaire de GEORGES CUVIER (Montbéliard, 1769.08.24 — Paris, 1832.05.13). Le 25 août 1835 une statue due à DAVID D'ANGERS avait été inaugurée dans sa ville natale. En dehors des travaux d'anatomie et de paléontologie qui lui ont valu la célébrité, CUVIER a laissé des écrits importants au point de vue de l'histoire de la science : *Rapport historique sur les sciences naturelles depuis* 1789 *et sur leur état actuel* (1810); *Éloges historiques* (5 volumes 1819-27); et un article historique sur les collections du Museum, publié au tome II des *Annales du Museum* (1803).

L. S.

Monument à Laplace. — Au début de juillet 1932 a été inaugurée à Beaumont-en-Auge (Normandie), une statue de LAPLACE (Beaumont-en-Auge, 1749. — Paris, 1827).

L. S.

Thirty-Third Critical Bibliography

of the

History and Philosophy of Science and of the History of Civilization

(*to December* 1931)

This thirty-third Bibliography contains about 610 items, some of which have been kindly contributed by the following scholars :

C. W. ADAMS (Hertford, England)
L. GUINET (Brussels)
C. A. KOFOID (Berkeley, Cal.)
C. D. LEAKE (Berkeley, Cal.)
J. R. PARTINGTON (Wembley, England)
J. PELSENEER (Brussels)
L. SAPIN (Brussels).

It includes 183 items yielded by the analysis of the 1931 facsimile reprints of *Henschel's Janus* (1846-1848) and the *Second Janus* (1851-1852) ; see review by GEORGE SARTON in *Isis*, 17, 283-84. An index of authors will be found at the end.

Papers and books sent to the Editor are entered into this bibliography if they are relevant to its purpose. They may be the object of analytical notes or longer reviews, if this seems sufficiently necessary and the services of competent scholars are available. It is obvious that only a small number of publications can be adequately reviewed and that it is not even possible to give a brief description of each and every one. However, our classification is so comprehensive and so minute, that even if we do nothing but give the accurate title of an item and put it in the proper place, we are already rendering a real service to the author the publisher, and the learned public. There is no relation between the importance of a publication and the length of the note devoted to it.

The ultimate aims of this undertaking are : (1) to establish the History of Science as an independent discipline ; (2) to demonstrate inductively the Unity of Knowledge and the Unity of Mankind ; (3) to serve as a center of information and rallying ground to the scholars engaged in our studies.

GEORGE SARTON.
American University
Beirut, Syria.

ALEXANDER POGO.
Harvard Library 189
Cambridge, Massachusetts

January 13, 1932.

PART I

FUNDAMENTAL CLASSIFICATION (CENTURIAL)

Vth Century B.C.

Brandeis, H. Die Krankheit zu Athen nach THUCYDIDES. Mit erläuternden Anmerkungen. 72 p. Stuttgart, CAST, 1845. ISIS

Reviewed by H. HAESER, *Henschel's Janus*, 2, 410, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931.

(Hippocrates). Bemerkungen zu einer HIPPOCRATES betreffenden Anecdote von W. A. GREENHILL. *Henschel's Janus*, 3, 357, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

(Hippocrates). Œuvres complètes d'HIPPOCRATE, traduction nouvelle avec le texte grec en regard, collationné sur les manuscrits et toutes les éditions, accompagnée d'une introduction, de commentaires médicaux, de variantes et de notes philosophiques, etc. Par E. LITTRÉ. T. V. 733 p. Paris, BAILLIÈRE, 1846. ISIS

Reviewed by J. G. THIERFELDER, *Henschel's Janus*, 2, 413-22, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Landsberg, M. HIPPOKRATES ein Homöopath. *Henschel's Janus*, 1, 787-90, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Landsberg, M. Ueber die Hippokratische Behandlung der Ischias. Ein Beitrag zur Geschichte der Medizin. *Second Janus*, 1, 48-65, 1851; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Landsberg, M. Ueber die in Attika zur Zeit des peloponnesischen Krieges herrschende Pest. Eine Nachlese. *Second Janus*, 2, 257-93, 438-85, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Menke, Friedr. Aug. Die Aphorismen des HIPPOCRATES. Durchaus berichtigte griechische Urschrift, deutsche Uebersetzung, kritischer Apparat und griechisches Verzeichniss. XII + 111 p. Bremen, 1844. ISIS

Reviewed by J. ROSENBAUM, *Henschel's Janus*, 1, 415-22, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Nelson, Grace W. A fifth century coin of Eretria. *Bulletin of the Museum of Fine Arts*, Boston, 29, 89-92, 9 figs., 1931. ISIS

A beautiful silver stater of 490-480 B.C., with a hoof-licking cow on the obverse, and an octopus on the reverse. A. P.

Petersen, Christianus. HIPPOCRATIS nomine quae circumferuntur scripta ad temporis rationes deposuit CHRISTIANUS PETERSEN. 51 p. Hamburg, 1839. ISIS

Reviewed by J. G. THIERFELDER, *Second Janus*, 1, 138-49, 1851; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Pétrequin, J. E. Recherches historiques sur l'origine du Traité du médecin, suivies d'une traduction nouvelle de ce livre, avec notes et commentaires. 31 p. Paris. ISIS

Reviewed by M. LANDSBERG, *Second Janus*, 2, 495-97, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Schneider, K. E. Chr. HIPPOKRATES und ARTAXERXES. Ein kritischer Versuch. *Henschel's Janus*, 1, 85-115, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

IVth Century B.C. (whole and first half)

Darmstaedter, Ernst. Der Schierlingsbecher. *Medizinische Welt*, 5, 4 p., 1931. ISIS

Gladstone, Ethel. DIOCLES OF CARYSTOS, and his letter to King ANTIGONUS. *California and West. Med.*, 34, 409-11, 1931. ISIS

English translation of this curious letter, an ancient example of popularized medicine. C. D. L.

(Plato). PLATO's Timäus. Übersetzt von K. E. CHR. SCHNEIDER. Vorwort von T. W. E. TH. HENSCHEL. *Henschel's Janus*, 2, 425-67, 625-89, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Suckow, Gust. Fr. Wilh. Ueber einen Widerspruch in der Beurtheilung der Hippokratischen Kunst und der Aerzte im Phaedrus des PLATON. *Second Janus*, 1, 247-67, 1851; reprinted, ALFRED LORENTZ, Leipzig, 1931.

IVth Century B.C. (second half)

Siwek, Paul. La psychophysique humaine d'après ARISTOTE. Préface de JACQUES CHEVALIER. x + 210 p. Paris, ALCAN, 1930. ISIS

1. La méthode employée par ARISTOTE dans le problème de l'activité psychologique; 2. L'âme-moteur dans la philosophie d'ARISTOTE; 3. Comment les choses matérielles engendrent des actes psychiques. La théorie de la

sensation; 4. Comment les actes psychiques produisent des phénomènes matériels; 5. La production des actes spirituels par les corps; 6. Comment la volonté rationnelle engendre des faits psychiques; 7. L'aristotélisme, «milieu» entre le spiritualisme et le matérialisme; « milieu » entre les théories de la causalité psychophysique réciproque et celle du parallélisme psychophysique (v. *Isis*, 18, 354), une étude du même auteur sur la psychophysique de SPINOZA.)

L. G.

IIIrd Century B.C. (whole and first half)

Pinoff, J., HEROPHILUS. Ein Beitrag zur Geschichte der Geburtshilfe. *Henschel's Janus*, 2, 739-743, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Ist Century B. C. (second half)

Meyer, Ernst H. J. Botanische Erläuterungen zu STRABO's Geographie nach einem Fragment des DIKAEARCHOS. Ein Versuch. viii+213 p. Königsberg, BORNTRÄGER, 1852.

Reviewed by M. LANDSBERG, *Second Janus*, 2, 497-502, 1852; reprinted ALFRED LORENTZ, Leipzig, 1931.

Meyer-Ahrens, C. Die Beri-Beri-Krankheit unter der Armee des AELIUS GALLUS in dem Feldzuge nach Arabien im Jahre 24 vor Christi Geburt. *Second Janus*, 2, 205-256, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Ist Century (whole and first half)

(Celsus). AULI CORNELII CELSI de medicina libri octo ex recensione LEONARDI TARGAE, quibus accedunt versio italica, de CELSI vita et opere, pharmacopoea et armamentarium chirurgicum, bibliotheca Celsiana latina et italica, annotationes criticae et historicae, indices locupletissimi et lexicon Celsianum curante SALVATORE DE RENZI. Tomus primus. VIII + 784 p. Naples, FILIATRO, 1851. ISIS

Reviewed by M. LANDSBERG, *Second Janus*, 2, 637-45, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

(Celsus). Di A. CORN. CELSO I libri otto della medicina volti in italiano con l'aggiunta di alcune osservazioni sopra CELSO, i suoi tempi e la sua opera, della bibliografia Celsiana, della farmacopea di CELSO, della biblioteca Celsiana e della biografia di TARGA e di LUPACCHINI. A cura di SALVATORE DE RENZI. Tomo secondo. VIII + 779 p. Naples, VAGLIO, 1852. ISIS

Reviewed by M. LANDSBERG, *Second Janus*, 2, 637-45, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Radin, Max. The trial of JESUS OF NAZARETH. IX + 266 p. Chicago, University Press, 1931. ISIS

Thackeray, Henry St. John. A lexicon to JOSEPHUS. Part I, A-ἀργός x + 80 p. (Publications of the Alexander Kohut Memoria Foundation.) Paris, GEUTHNER, 1930. ISIS

Ist Century (second half)

Glover, Terrot Reaveley. The world of the New Testament. 233 p. Cambridge, University Press, 1931. ISIS

(Pliny). S. Plini Sec. Naturalis historiae libri XXXVII. Recensuit et commentariis criticis indicibusque instruxit IULIUS SILLIG. Vol. 1. 22 + 84 + 487 p. Hamburg, PERTHES, 1851. ISIS

Reviewed by J. G. THIERFELDER, *Second Janus*, 1, 295-98, 1851; reprinted, ALFRED LORENTZ, Leipzig, 1931.

IInd Century (whole and first half)

Berthelot, André. L'Asie ancienne centrale et sud-orientale d'après PTOLÉMÉE. 423 p., 24 maps. (Bibliothèque géographique.) Paris, PAYOT, 1930. ISIS

Reviewed by ERNST HONIGMANN, *DLZ*, 2, 1713-17, 1931.

Daremberg, Ch. Die dem RUFUS zugeschriebene Schrift über den Puls. Mit Bemerkungen von M. LANDSBERG. *Henschel's Janus*, 1, 799-811, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Fränkel, Hieron. Zu SORANUS. *Henschel's Janus*, 3, 360-61, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Pinoff, J. Die Geburtshilfe des SORANUS EPHESIUS nach dessen Werke *περὶ γυναικείων παθῶν*. *Henschel's Janus*, 1, 705-52, 1846; 2, 16-52, 217-45, 732-38, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

IInd Century (second half)

Burr, Charles W. GALEN. *Annals of Med. Hist.*, 3, 209-17, 1931. ISIS

Ermerins, F. Z. Emendationen zum Galenischen Text des HIPPOCRATES und GALEN's Commentar zum Prognosticon. *Henschel's Janus*, 2, 1-15, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Frazer, James George. Graecia Antiqua. Maps and plans to illustrate PAUSANIAS's Description of Greece. Compiled by Sir JAMES GEORGE FRAZER, with explanatory text by A. W. VAN BUREN. XII + 161 p. London, MACMILLAN, 1930. ISIS

Reviewed by J. L. MYRES, *Geographical Journal*, 77, 371, 1931. "A set of the maps and plans included in Sir JAMES FRAZER's edition of PAUSANIAS, interleaved with brief explanatory notes. Most of the maps do not seem to have been altered, but the notes indicate how they should be brought up to date."

Greenhill, W. Emendationen zum Texte des GALEN. *Henschel's Janus*, 1, 625-38, 1846; 3, 675-86, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Henschel, A. W. E. Th. GALEN's Anatomie. *Henschel's Janus*, 2, 396, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Hermann, Karl Fr. LUCIAN's Schnellfuss oder die Tragödie vom Podagra; übersetzt und seinem verehrten Freunde und Collegen Dr. CONRADI zur Mitfeier seines fünfzigjährigen Doctorjubiläums am 13. Jan. 1852 gewidmet von KARL FR. HERMANN. 276 p. Göttingen, DIETERICH, 1852. ISIS

Reviewed by J. G. THIERFELDER, *Second Janus*, 2, 491-93, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Klose, C. W. Ueber das Leben des ARETAEUS und seine auf uns gekommenen Schriften. *Second Janus*, 1, 105-26, 217-46, 1851; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Larkey, Sanford V. GALEN: Greek, medievalist, and modern. *California and West. Med.*, 34, 271-75, 366-69, 1931. ISIS

Contains a good English translation (by GERALDINE LARKEY) of the first five chapters of "The use of parts." C. D. L.

Prendergast, J. S. The background of GALEN's life and activities and its influence on his achievements. *Proc. Roy. Soc. Med.*, 23, 53-70, 1930. ISIS

Important contribution. C. D. L.

Prendergast, J. S. GALEN's views of the vascular system in relation to HARVEY. *Proc. Roy. Soc. Med.*, 21, 1839-48, 1928. ISIS

An excellent study. C. D. L.

Schneider, K. E. Chr. Neuentdeckte Schriften GALEN's. *Henschel's*

Janus, 1, 599-624, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Walsh, Joseph. Refutation of the charges of cowardice made against GALEN. *Annals of Med. Hist.*, 3, 195-208, 4 illus., 1931. ISIS

Dr. WALSH should collect and expand his many interesting studies of GALEN into a monograph worthy of his great subject. C. D. L.

IVth Century (second half)

Bussemaker, U. Cats. Ueber MAGNUS VON EMESUS und dessen Buch vom Harne. *Henschel's Janus*, 2, 273-97, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Apropos of MAGNOS OF EMESA, who flourished about the fourth to the sixth century (SARTON's *Introduction*, 2, 75).

Fränkel, Hieron. POSIDONIUS. *Henschel's Janus*, 3, 362-68, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Henschel, A. W. E. Th. Der Presbyter AËTIUS. *Henschel's Janus*, 2, 424, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Lewy, A. Ueber die Bedeutung des ANTYLLUS, PHILAGRIUS und POSIDONIUS in der Geschichte der Heilkunde, nach dem Manuscripte des verstorbenen Cand. med. A. LEWY bearbeitet von M. LANDSBERG. *Henschel's Janus*, 2, 298-329, 744-71, 1847; 3, 166-84, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Additional note on PHILAGRIUS and POSIDONIUS, by A. W. E. TH. HENSCHEL, *ibid.*, 2, 400, 1847.

(Oribasius.) Œuvres d'ORIBASE, texte grec, en grande partie inédit, collationné sur les manuscrits, traduit pour la première fois en Français; avec une introduction, des notes, des tables et des planches par U. C. BUSSEMAKER et CH. DAREMBERG. T. I. LX + 692 p. Paris, BAILLIÈRE, 1851. ISIS

Reviewed by K. E. C. SCHNEIDER, *Second Janus*, 2, 152-54, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Vth Century (whole and first half)

Daremberg, Ch. AURELIUS de acutis passionibus. Texte publié pour le première fois d'après un manuscrit de la Bibliothèque de Bourgogne à Bruxelles, corrigé et accompagné de notes critiques. *Henschel's Janus*, 2, 468-99, 690-731, 1 facs., 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Nau, François. Les « belles actions » de MAR RABBOULA évêque d'Edesse de 412 au 7 août 435 (ou 436). *Revue de l'histoire des religions*, 103, 97-135, 1931. ISIS

Stegemann, Viktor. Astrologie und Universalgeschichte. Studien und Interpretationen zu den Dionysiaka des NONNOS von Panopolis. *Στοιχεῖα*. Studien zur Geschichte des Antiken Weltbildes und der Griechischen Wissenschaft begründet von FRANZ BOLL. Heft IX. VIII + 257 p., 1 map. Leipzig, TEUBNER, 1930. (R.M. 16). ISIS

" Von NONNOS Leben wissen wir so gut we gar nichts." Er ist in Panopolis in Oberägypten geboren. Seiner dichterischen Tätigkeit lag er in Alexandria ob. Die Lebenszeit des NONNOS ist unbestimmt (ca. 380-450). " Es gibt keinen Autor der grieshisch-römischen Antike, der in ähnlicher Weise wie NONNOS den Versuch einer historischen Weltdeutung auf der Grundlage der Astrologie gemacht hat." " Die Verbindung der bekannten Elemente mit der Anschauung der Astrologie von Weltenmonaten, sowie die Einbeziehung der gegenwärtigen Zeit in den Ablauf derselben und die Bestimmung eines Telos, das dem Ablauf der Tierkreisbilder und Weltenmonate einen Sinn gibt, ist einzig bei NONNOS vorhanden." L. S.

VIIth Century (whole and first half)

Alexander, A. Weitere Nachweisungen über PAULUS, Arzt und Bischof von Emerita. *Henschel's Janus*, 2, 618-19, 1847 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Heusinger, C. F. Ueber PAULUS, Arzt und Bischof von Emerita, der zuerst den Kaiserschnitt an einer Lebenden verrichtet haben soll. *Henschel's Janus*, 1, 764-70, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Additional note, by A. ALEXANDER, *ibid.*, 2, 618-19, 1847.

Spengler, L. ISIDORUS HISPALENSIS in seiner Bedeutung für die Naturwissenschaften und Medicin. *Henschel's Janus*, 3, 54-90, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Xth Century (second half)

Thierfelder, J. G. Beweis dass das Almaleki des ALI BEN ABBAS und das Pantechnum des ISHAK BEN SOLEIMAN identisch und Letzterer der wahre Verfasser des Werkes sei. *Henschel's Janus*, 1, 685-687, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931.

XIth Century (whole and first half)

Gray, Edward F. LEIF ERIKSSON, discoverer of America, A.D. 1003. XXXII + 138 p. Oxford, University Press, 1930. ISIS

Reviewed by G. M. GATHORNE-HARDY, *Geographical Journal*, 77, 381-82, 1931. "He claims to have settled conclusively and in detail the situation of LEIF ERIKSSON's camp in Vinland. So dogmatic an expression of certainty seems extremely rash and unlikely to meet with general acquiescence. On the other hand, in his approach to the broader aspects he is probably nearer the mark than many other writers. He has devoted much time and study to a close investigation of what seem to him to be the relevant parts of the coast-line."

XIth Century (second half)

Sontheimer, Joseph. v. Nachricht von einer arabisch-medicinischen Handschrift vermuthlich des IBN DSCHEZLA. *Henschel's Janus*, 2, 246-72, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Ms. of the *Taqwîm al-abdân* of IBN JAZLA. Fully analyzed.

Thierfelder, J. G. ODO, ein veronesischer Arzt, als Verfasser des unter dem Namen AEMILIUS MACER de herbarum virtutibus bekannten Lehrgedichts. *Henschel's Janus*, 3, 372, 1848; reprinted, ALFRED LORENTZ, Leizpig, 1931. ISIS

XIIth Century (whole and first half)

✓ **Corner, George W.** The rise of medicine at Salerno in the twelfth century. *Ann. Med. Hist.*, 3, 1-16, 1931. ISIS

"Looking back upon the great days of the twelfth century, what place in history do we grant the physicians of Salerno? Not the first place, which is reserved for the pioneers and discoverers of our art. Their task was to take over the Arabic medical culture and adapt it to the needs of awakening Europe. While doing this, like the good physicians of all ages, they brought common sense and sympathy to the sick-room, they sought all the knowledge they could find and taught their students to go on seeking."

(French physicians). Kurze Nachrichten über die ältesten französischen Aerzte des XII. Jahr. *Second Janus*, 2, 659-61, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Wagner, Félix. Les poèmes héroïques de l'Edda et la saga des Völsungs. Traduction française d'après le texte original islandais (édité par KARL HILDEBRAND) précédée d'une étude sur les poèmes scandinaves dans leurs rapports avec la saga en prose et l'épopée des Nibelungen

et accompagnée de notices explicatives. 276 p. Paris, LEROUX, 1929. ISIS

Reviewed by BERNHARD KUMMER, *DLZ*, 2, 1801-04, 1931.

XIIth Century (second half)

Henschel, A. W. E. Th. Der älteste medicinische Codex der Breslauer Universitätsbibliothek. *Henschel's Janus*, 1, 639-84, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Henschel, A. W. E. Th. Die Salernitanische Handschrift. *Henschel's Janus*, 1, 40-84, 300-68, pl., 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

(Joachimus Calaber, abbot of Floris). GIOACCHINO DA FIORE. Tractatus super quatuor Evangelia. Prima edizione sui codici di Padova e di Dresda a cura di ERNESTO BUONAIUTI. Vol. I. XXI + 362 p., 2 pl. (Fonti per la storia d'Italia, pubblicate dall' Istituto Storico Italiano, Scrittori Secolo XII.) Rome, Istituto Storico Italiano, 1930. ISIS

Reviewed by ERNST BENZ, *DLZ*, 2, 1585-91, 1931.

XIIIth Century (whole and first half)

Aga-Oglu, M. On a manuscript by AL-JAZARI. *Parnassus*, 3, 27-28, 3 illus., 1931. ISIS

A MS., with automata miniatures, in the collection of H. KEVORKIAN in New York. According to the colophon, it was written A. H. 715 (A.D. 1315). "The manuscript thus can be dated thirty-nine years earlier than that in the Hagia Sophia Library and is today the earliest known copy of this work." See *Isis*, 6, 149; 7, 191; 13, 427-28. A. P.

Henschel, A. W. E. Th. Nachträge zur Geschichte der Medicin in Schlesien im XIII. Jahrhundert. *Second Janus*, 1, 193-216, 1851 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Henschel, A. W. E. Th. Die Wunderheilungen der heil. HEDWIG in Schlesien im XIII. Jahrhundert. *Second Janus*, 2, 177-92, 1852 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Holmyard, Eric John. MANṢÛR AL-KÂMILY. *Archeion*, 13, 187-90, 1931. ISIS

BROCKELMANN place MANṢÛR AL-KÂMILY au premier quart du XVIII[e] siècle. Il y a là une erreur manifeste, puisque AL-JILDAKÎ parle de lui au milieu du XIV[e]. MANṢÛR AL-KÂMILY était contemporain du calife AL-KÂMIL (1218-38)

et directeur de la Monnaie du Caire. On lui doit un livre technique « The book of the discovery of the practical secrets of the Egyptian mint ». L. G.

Littré, E. Bemerkungen über die Syphilis im 13. Jahrhundert. *Henschel's Janus*, 1, 585-98, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

XIIIth Century (second half)

Alfonso el Sabio. General estoria. Primera parte. Edición de ANTONIO SOLALINDE. Madrid, Centro de Estudios Historicos, 1930. ISIS

Choulant, Ludwig. ALBERTUS MAGNUS in seiner Bedeutung für die Naturwissenschaften, historisch und bibliographisch dargestellt. *Henschel's Janus*, 1, 127-60, 1846 ; reprinted ALFRED LORENTZ, Leipzig, 1931. ISIS

Additional bibliography, by J. G. THIERFELDER, *ibid.*, 1, 687-90, 1846.

Pellegrini, Francesco. Sulla patria de FRANCESCO PINDEMONTE. *Rivista di Storia delle Scienze Mediche e Naturali*, 22, 187-97, 1 pl., 1931. ISIS

Pouchet, F. A. Histoire des sciences naturelles au moyen âge, ou ALBERT LE GRAND et son époque, considérés comme point de départ de l'école expérimentale. v + 656 p. Paris, BAILLIÈRE, 1853. ISIS

Reviewed by E. MEYER, *Second Janus*, 2, 651-54, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Wakkernagel, W. Meinauer Naturlehre. 22. Publication des lit. Vereins in Stuttgart. (Fünfter Jahrgang, 1849-1850. Fünfte Publication). ISIS

Reviewed by HENSCHEL, *Second Janus*, 2, 654-56, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

XIVth Century (whole and first half)

Henschel, A. W. E. Th. PETRARCA's Urtheil über die Medizin und die Aerzte seiner Zeit. *Henschel's Janus*, 1, 183-223, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

(Paris). Notizen über die med. Fakultät der Pariser Universität (aus EG. BULAEUS Hist. Univ. Paris, IV.) im XIV. Jahrhundert. ISIS

Reviewed by A. W. E. TH. HENSCHEL, *Henschel's Janus*, 3, 576, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931.

XIVth Century (second half)

Schmidt, Nathaniel. IBN KHALDUN, historian, sociologist, and philosopher. 68 p. New York, Columbia University Press, 1930. ISIS

Reviewed by H. A. R. GIBB, *Geographical Journal*, 77, 572, 1931. "Professor SCHMIDT's study is intended to serve as an introductory essay to a new edition and translation of the Prolegomena. It is for the most part bibliographical, even in the three principal chapters in which a variety of views on IBN KHALDUN's position as historian, philosopher of history, and sociologist are assembled and examined."

XVth Century (whole and first half)

(Gutenberg). Gutenberg-Jahrbuch 1930. Hrsg. v. ALOYS RUPPEL. 359 p., pl., fig. Mainz, Gutenberg-Gesellsch., 1930. ISIS

Reviewed by ALOYS BÖMER, *DLZ*, 2, 1633-35, 1931.

Haebler, Konrad. Die Erfindung der Druckkunst und ihre erste Ausbreitung in den Ländern Europas. Vortrag, gehalten in der Generalversammlg. d. Gutenberg-Gesellsch. am 22. Juni 1930. 22 p. Mainz, Gutenberg-Gesellsch., 1930. ISIS

Reviewed by ALOYS BÖMER, *DLZ*, 2, 1633-35, 1931.

Henschel, A. W. E. Th. Der Inhalt einer schlesischen sogen. Apotheke im Anfang des XV. Jahrhunderts. *Henschel's Janus*, 2, 152-54, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Wickersheimer, Ernest. Le calendrier de la faculté de médecine de Paris au XV^e^ siècle. *Janus*, 35, 59-66, 1931. ISIS

WICKERSHEIMER publie ce calendrier qui était resté inédit et qui figure au Ms. 1003 de la bibliothèque de Reims. L. G.

Wüstenfeld, F. W. MACRIZI's Beschreibung der Hospitäler in el-Câhira. Aus den arabischen Handschriften zu Gotha und Wien übersetzt. *Henschel's Janus*, 1, 28-39, I-VIII, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

XVth Century (second half)

Ailly, Pierre d'. Ymago Mundi. Texte latin et traduction française des quatre traités cosmographiques de D'AILLY et des notes marginales de CHRISTOPHE COLOMB. 3 vol. 828 p,. 36 pl. Paris, MAISONNEUVE, 1930. ISIS

Reviewed by E. G. R. TAYLOR, *Geographical Journal*, 77, 290-92, 583,

1931. "The book is a collection of sixteen tracts published under the title of the first, and was originally written between 1410 and 1419. After being widely circulated in manuscript form, it appeared in print at some time between 1480 and 1490. Four of the tracts deal with cosmography, the remainder are astronomical : of the four, the Imago Mundi and its Epilogue epitomize the best geographical thought of the Fathers and of the Schoolmen, while the two remainder introduce the reader to the newly recovered Geography of PTOLEMY. No other work throws a clearer light on the geographical thought of the Age of Discovery." "The third volume contains two Compendiums of Cosmography based mainly on the newly translated PTOLEMY."

Hubbard, Lucius L. Did COLUMBUS discover the islands Antigua and St. Martin? *Geographical Review*, 21, 584-97, 2 fig., 1931. ISIS

Lawrence, Arnold Walter; Young, Jean. Narratives of the discovery of America. Edited by A. W. LAWRENCE and JEAN YOUNG. XIII+300 p., illus., maps. London, CAPE, 1931. ISIS

Meyer, Ernst. Noch Einiges über den Ortus Sanitatis. *Henschel's Janus*, 3, 91-97, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Schneider, Ans. Urkunde über die Aufnahme und Privilegirung eines jüdischen Arztes in Fulda Ende XV. Jahrhunderts. *Henschel's Janus*, 3, 368, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Stricker, Wilhelm. Ueber JOHANN VON CUBE, Stadtarzt zu Frankfurt am Main und Verfasser des Ortus sanitatis, zum Theil nach den Aufzeichnungen von GEORG KLOSS. *Henschel's Janus*, 1, 779-86, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

XVIth Century (whole and first half)

C. — *Natural sciences*

Aschner, Bernhard. Die Pflanzenheilkunde bei PARACELSUS. *Acta Paracelsica*, Heft 4, 89-107, 1931. ISIS

Strunz, Franz. Mensch und Natur in der Weltanschauung des PARACELSUS. *Arcta Paracelsica*, Heft 4, 108-20, 1931. ISIS

Taylor, E. G. R. Master HORE's voyage of 1536. *Geographical Journal*, 77, 469-70, 1931. ISIS

"The account published by RICHARD HAKLUYT has always aroused scepticism. A search at the Public Record Office for contemporary evidence

has proved successful. The documents yield no details of the voyage, but indicate its purpose, simply the capture of Newfoundland fish. RICHARD HORE was a citizen of London. The major hardships alleged in the account received by HAKLUYT must have existed only in the minds of the narrators."

Taylor, E. G. R. Tudor geography, 1485-1583. IX + 290 p. London, METHUEN, 1930. ISIS

Reviewed by G. R. CRONE, *Geographical Journal*, 77, 289-90, 1931. "The foundation of this study is a bibliography of all English geographical writings in manuscript or print, prior to 1583, arranged chronologically, printed as an appendix. One of the main objects of the book is to show that the voyages of FROBISHER, DRAKE, GILBERT, PET, and JACKMAN were carefully planned in accordance with current geographical conceptions, however erroneous these were subsequently proved to be. The moving spirit was Dr. JOHN DEE, whose character as a serious geographer is here vindicated."

D. — *Medical sciences*

Darmstaedter, Ernest. Arznei und Alchemie : PARACELSUS Studien. *Stud. Gesch. Med.*, 20, 77 p., Leipzig. ISIS

Reviewed by G. STICKER in *Mitteilungen zur Geschichte der Medizin und der Naturwissenschaften*, 30, 209, 1931.

Fuchs, C. H. FRANCESCO DELICADO über den Guajac. Ein Beitrag zur älteren Bibliographie und Geschichte der Syphilis. *Second Janus*, 2, 193-204, 1852 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Fulton, John F. Early medical humanists : LEONICENUS (1428-1524), LINACRE (1460-1524), and THOMAS ELYOT (d. 1546). *New Eng. J. Med.*, 205, 141-46, 1931. ISIS

Also contains valuable notes on SYMPHORIEN CHAMPIER (1472-1539) and ETIENNE DOLET (1508-1546). Excellent bibliographical data. C. D. L.

Stratman-Thomas, W. K. GIROLAMO FRACASTORO (1478-1553) and syphilis. *California and West. Med.*, 33, 739-42, 1930. ISIS

Stricker, W. Geschichtliche Untersuchung über EUCHARIUS RÖSLIN (RHODION). *Henschel's Janus*, 2, 394-95, 1847 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

E. — *Alia*

Haebler, Konrad. Rollen- und Plattenstempel des XVI. Jahrhunderts. Unter Mitwirkung von ILSE SCHUNKE. Bd. I u. II. XI + 518 p., 2 pl. ; 480 p., 8 pl. (*Sammlung bibliothekswiss. Arbeiten.* Begr.

v. KARL DZIATZKO, fortgef. u. hrsg. v. K. HAEBLER. H. 41 u. 42 (II. Serie, H. 24 u. 25.) Leipzig, HARRASSOWITZ, 1928/29. ISIS

Reviewed by HILDEGARD ZIMMERMANN, *DLZ*, 2, 1567-70, 1931.

Magnaghi, Alberto. Il planisfero del 1523 della Biblioteca del Re in Torino. La prima carta del mondo costruita dopo il viaggio di MAGELLANO ; unica copia conosciuta di carta generale ad uso dei piloti dell'epoca delle grandi scoperte. 92 p., maps. Florence, LANGE, 1929. ISIS

Reviewed by GEORGE E. NUNN, *Geographical Review*, 21, 684-86, 1931.

Renard, Georges. L'utopie de THOMAS MORUS. *Rev. pol. et parlementaire*, 148, 381-93, 1931. ISIS

XVIth Century (second half)

B. — *Physical sciences and technology*

Ferguson, John (1837-1916). The secrets of ALEXIS. A sixteenth century collection of medical and technical receipts. *Proceedings of the Royal Society of Medicine*, 24, 1-22, 1930. ISIS

ALEXIS OF PIEDMONT (*Isis*, 16, 492, 1931) : the date for the " first (lost) edition " given, " Venice, about 1555," seems incorrect. I have seen editions of 1540 (Rome) and 1550 (Paris) advertised in booksellers' catalogues.

J. R. P.

C. — *Natural sciences*

Heawood, Edward. An unplaced atlas of AUGUSTIN ROUSSIN. *Geographical Journal*, 77, 160-61, 398, 1931. ISIS

" Photostat copies of the sheets of a MS. atlas drawn at Marseilles by AUGUSTIN ROUSSIN, received by the Explorers' Club of New York, with no hint of the sender's name and no clue to the place where the original atlas is preserved. The only other work of this draughtsman generally known is an atlas owned by NORDENSKIÖLD; the date in this was thought by its owner to be 1590."

D. — *Medical sciences*

Benedict (d. ältere). Dr. WILHELM FABRICIUS VON HILDEN, sein Zeitalter und der Zustand der Wundarzneikunst in Deutschland während desselben. Ein historischer Versuch. *Henschel's Janus*, 3, 225-82, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Garcia ab Horto (del Huerto). Aromatum et simplicium aliquot medicamentorum apud Indos nascentium historia, Latino sermone

in epitomen contracta et iconibus ad vivum expressis locupletioribusque annotatiunculis illustrata a CAROLO CHESIO. Antwerp, 1579. ISIS

Quoted by H. BRETSCHNEIDER, *Second Janus*, 1, 157-58, 1851; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Meyer-Ahrens, Konrad. Der Stich in den Jahren 1564 und 1565 im Zusammenhange mit den übrigen Epidemien der Jahre 1562-1566. 182 p. Zürich, SCHULTHESS, 1848. ISIS

Reviewed by A. W. E. TH. HENSCHEL, *Henschel's Janus*, 3, 815-18, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Steinheim, D. Wer ist der Entdecker des Blutkreislaufes? Eine Erinnerung an ANDREAS CESALPINUS. *Henschel's Janus*, 2, 547-79, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Stricker, W. ADAM LONICERUS und die Geburtshülfe seiner Zeit. *Henschel's Janus*, 2, 619-24, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

XVIIth Century (whole and first half)

A. — *Mathematics*

Agostini, Amedeo. Il problema inverso delle tangenti e l'integrazione indefinita nelle opere del TORRICELLI. *Archeion*, 13, 55-59, 1931. ISIS

Agostini, Amedeo. Ancora sul problema inverso delle tangenti e sull' integrazione indefinita nelle opere di TORRICELLI. *Archeion*, 13, 65, 1931. ISIS

Bortolotti, Ettore. La integrazione indefinita ed il teorema di inversione nell'opera del TORRICELLI. *Archeion*, 13, 60-64, 1931. ISIS

Boys, C. V. Logarithms. *Mathematical Gazette*, 15, 367-68, 1931. ISIS

A note on the number of figures to be retained in order to obtain a given degree of approximation in BRIGGS's method of calculating the common logarithms of prime numbers; and the consequent correction of CHARLES HUTTON's account of BRIGGS's method in the historical introduction to the first six editions of his Mathematical Tables. C. W. A.

Brunet, Pierre. La notion d'infini mathématique chez BUFFON. *Archeion*, 13, 24-39, 1931. ISIS

Examen des considérations développées par BUFFON dans sa traduction (1740) du *Treatise of fluxions*, de NEWTON, sous le titre : *La Méthode des fluxions et des suites infinies*, et dans la préface de cette traduction sur l'idée de l'infini. L. G.

Gilson, Etienne. DESCARTES et la métaphysique scolastique. *Revue de l'Université de Bruxelles*, 29, 105-39, 1923-1924. ISIS

Wieleitner, Heinrich. Der Abstand eines Punktes von einer Geraden bei SCHOOTEN und LEIBNIZ. *Zeitschrift f. mathem. u. naturwiss. Unterricht*, 62, 18-20, 1 fig., 1931.

Wieleitner, Heinrich. Über KEPLERS *Neue Stereometrie der Fässer. Kepler-Festschrift*, Sonderabdruck. *Naturwissenschaftlicher Verein zu Regensburg*, XIX. Heft : p. 279-313, 19 fig. *Bericht* für die Jahre 1928-30. ISIS

B. — *Physical sciences and technology*

Forti, Umberto. Introduzione storica alla lettura del Dialogo sui massimi sistemi di GALILEO GALILEI. 211 p. Bologna, ZANICHELLI, 1931. ISIS

Chacune des quatre parties du Dialogue dont d'assez larges extraits sont donnés, reliés par un résumé, est précédée et accompagnée de commentaires d'UMBERTO FORTI : note sur la composition du dialogue, note sur les taches du soleil (p. 9-26), sur le principe de l'inertie (57-74), sur l'interprétation des mouvements planétaires (101-44), sur les théories des marées (163-99). L. G.

Humbert, Pierre. La première carte de la lune. *Rev. des questions scientifiques*, 100, 193-204, 1931. ISIS

La première carte de la lune est celle qui, en 1634, fut entreprise sous les auspices de PEIRESC et de GASSENDI, tout d'abord par le peintre CLAUDE SAUVÉ (1634-35), puis par CLAUDE MELLAN (1676) assisté de AGARRAT, le secrétaire de GASSENDI. En 1637, à la mort de PEIRESC, trois planches étaient gravées, dont la réunion constitue le plus ancien atlas lunaire, dont la Bibliothèque nationale de Paris semble seule à l'heure actuelle posséder un exemplaire. Ces trois planches sont ici reproduites. On ignore le nombre de celles qui devaient les accompagner. L. G.

Quignon, Georges. CHARLES MALAPERT, astronome montois (1581-1630). *Ciel et Terre*, 46, 4-10, 1930. ISIS

Waard, Cornélius de. Une lettre inédite de MERSENNE à DESCARTES. Avec introduction et notes. *Archeion*, 13, 175-86, 1931. ISIS

La lettre de MERSENNE (1646) discute le problème du funépendule. L. G.

C. — *Natural sciences*

Moreland, William Harrison. Relations of Golconda in the early seventeenth century. Edited by W. H. MORELAND. LI + 109 p., maps. London, Hakluyt Society, 1931. ISIS

D. — *Medical sciences*

Chance, Burton. NICHOLAS CULPEPER, Gent : student in physick and astrologie. 1616-1653/4. *Annals of Medical History*, 3, 394-403, 4 fig., 1931. ISIS

Guhrauer, G. E. JOACHIM JUNGIUS, der Baco der Deutschen. *Henschel's Janus*, 1, 812-22, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Lambert, Samuel W. PHINEAS FLETCHER and FRANCIS QUARLES and *The Purple Island* of PHINEAS FLETCHER. *Annals of Medical History*, 3, 568-78, 1931. ISIS

Pearl, Raymond. Quotations. HARVEY's post-mortem examination of THOMAS PARR. *Human Biology*, 3, 138-42, 1931. ISIS

Rolleston, Sir Humphrey. History of cinchona and its therapeutics. *Ann. Med. Hist.*, 3, 261-70, 1931. ISIS

Address at the Cinchona Tercentenary celebration at the Wellcome Historical Medical Museum, London, 10 December, 1930.

Sergi, Antonio. Introductione de cinchona in Europa. *Schola et vita*, 6, 173-76, 1931. ISIS

Thompson, C. J. S. The history and lore of cinchona. *Brit. Med. J.*, 2, 1188-90, 1928. ISIS

E. — *Alia*

Besson, Maurice. Précurseurs et pionniers de l'expansion française en Afrique. FRANÇOIS GAUCHE, premier explorateur français de Madagascar, 1638-44. *L'Afrique française*, 40, 545-48, 1930. ISIS

Giuli, G. de. GALILEO e DESCARTES. *Scientia*, 49, 207-220, 1931 ; traduct. française, *ibid.*, supplément, 85-96. ISIS

Schneider, Jos. ATHANASIUS KIRCHERUS. *Henschel's Janus*, 2, 599-608, 1847 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

XVIIth Century (second half)

A. — *Mathematics*

Hofmann, Jos. E. ; Wieleitner, Heinrich. Erste Versuche LEIBNIZens und TSCHIRNHAUSens, eine algebraische Funktion zu integrieren. *Archiv f. Geschichte d. Mathematik, d. Naturwissenschaften u. d. Technik*, 13, 277-92, 3 fig., 1931. ISIS

B. — *Physical sciences and technology*

Gliozzi, Mario. L'aerostatica di OTTO VON GUERICKE. *Archeion*, 13, 191-200, 1931. ISIS

Une seule œuvre de OTTO DE GUÉRICKE fut imprimée : " Experimenta nova (ut vocantur) Magdeburgica de Vacuo Spatio," Amsterdam, 1672. L'auteur montre l'ingéniosité expérimentale d'OTTO DE GUÉRICKE. L. G.

Jenkins, Rhys. A chapter in the history of the water supply of London : A Thames-side pumping installation and Sir EDWARD FORD's patent from CROMWELL. *The Newcomen Society, Transactions*, 9, 43-51, 2 pl. 1928-29. ISIS

Sir EDWARD FORD, 1605-1670.

(Montanari). La carte de la lune de MONTANARI (1662). *Ciel et Terre*, 46, 263, 1930 ; 47, 25-27, 76-83, 107-09, 1931. ISIS

C. — *Natural sciences*

(Kelsey, Henry). The KELSEY Papers, with an introduction by ARTHUR G. DOUGHTY and CHESTER MARTIN. Published by the Public Archives of Canada and the Public Record Office of Northern Ireland. LXXXIV + 128 p. Ottawa, ACLAND, 1929. ISIS

Reviewed in *Geographical Journal*, 77, 481, 1931. " HENRY KELSEY was in the employ of the Hudson's Bay Company from 1683 till his death about 1730. As documents bearing upon this period of Canadian history are rare, the discovery of these papers was most fortunate."

(Leeuwenhoek, Anthony van). Veertien tot heden geheel onuitgegeven brieven van ANTHONY VAN LEEUWENHOEK uit de jaren 1674-1678. Fourteen hitherto totally unpublished letters of ANTHONY VAN LEEUWENHOEK from the years 1674-1678. LXXV + 145 p., portr., facsim., 15 pl. *Opuscula selecta Neerlandicorum de arte medica*, fasciculus IX. Amsterdam, 1930 (on the title page ; 1931 on the binding). ISIS

The volume contains a preface by G. VAN RIJNBERK, an introduction

by E. C. VAN LEERSUM, a historical and bibliographical notice by CLIFFORD DOBELL, an iconographical notice by J. G. DE LINT, and the text and translation of the earliest letters of LEEUWENHOEK never before published. A. P.

Oldham, Richard Dixon. FRANCESCO OLIVA THE YOUNGER. *Geographical Journal*, 77, 204-05, 1931. ISIS

"The conclusion is that there was a second mapmaker bearing the name, of later date, who worked in Marseilles. To this craftsman may be ascribed the atlas in the national library at Naples, regarded as of mid-seventeenth century make, and possibly that preserved in the Venice library, which bears the mark F.O. 1659, considered to be the initials of FRANCESCO OLIVA, and date of making."

Ortelius, A. A. ORTELII catalogus cartographorum, bearbeitet von LEO BAGROW. Zweiter Teil (M-Z). 135 p. (*Petermanns Mitteilungen*, Ergänzungsheft, Nr. 210). Gotha, PERTHES, 1930. ISIS

Reviewed by E. HEAWOOD, *Geographical Journal*, 77, 562-64, 1931. Part one was recorded in *Isis*, 13, 173, 1929. Among the cartographers now dealt with are MERCATOR, MÜNSTER, CARDINAL A CUSA, NICOLAUS GERMANUS, NICOLAS DE NICOLAY of Dauphiné, CHRISTIAAN SGROOTEN (whose name is found written in twenty-six ways), TILMAN STOLZ (latinized TILEMANUS STELLA), TSCHUDI, and WALDSEEMÜLLER. C. W. A.

D. — *Medical sciences*

Haeser, H. Notiz über die Entdeckung der wahren Natur der Krätze durch GIACINTO CESTONI von Livorno, i. J. 1687. *Second Janus*, 2, 485-87, 1852 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Kissel, Carl. SYDENHAM, nicht Hippokratiker, sondern Vorgänger RADEMACHERS. *Second Janus*, 1, 268-92, 1851 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Peachey, George C. THOMAS TRAPHAM (CROMWELL's surgeon)—and others. *Proc. Roy. Soc. Med.*, 24, 1441-49, 1931. ISIS

Entertaining accout of TRAPHAM (d. 1672), chosen to embalm CHARLES I, and his associate physicians to CROMWELL, GEORGE BATE (1608-1668) and JONATHAN GODDARD (d. 1675).

C. D. L.

Sydenham, Thomas. Anecedota Sydenhamiana : medical notes and observations of THOMAS SYDENHAM, M.D. hitherto unpublished. VIII + 80 p. Oxford, 1845. ISIS

Reviewed by J. K. F. TRAUTNER, *Henschel's Janus*, 3, 350-51, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Thierfelder, J. G. SYDENHAM's wissenschaftlicher Charakter und seine Bedeutung für unsere Zeit. Zur Berichtigung des Aufsatzes : SYDENHAM, nicht Hippokratiker, sondern Vorgänger RADEMACHER's. Von Dr. KISSEL, in dieser Zeitschrift, Bd. 1, H. 2, 268 ff. *Second Janus*, 2, 426-38, 1852 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

E. — *Alia*

(Leibniz). The monadology of LEIBNIZ : with an introduction, commentary, and supplementary essays. By HERBERT WILDON CARR. IX + 213 p. London, Favil Press, 1930. ISIS

Reviewed by T. G., *Nature*, 128, 136, 1931.

Locke, John. An essay concerning the understanding, knowledge, opinion and assent. Edited, with an introduction by BENJAMIN RAND. LIX + 307 p. Cambridge, Mass., Harvard University Press, 1931. ISIS

Siwek Paul. L'âme et le corps d'après SPINOZA (la psycho-physique spinoziste). XXVIII + 204 p. *Collection historique des grands philosophes*. Paris, ALCAN, 1930. ISIS

L'auteur a consacré ses deux thèses de doctorat ès-lettres de l'Université de Paris à la psychophysique. L'une d'elles traite de la psychophysique humaine d'après ARISTOTE (V. *Isis*, 18, 336, 1932); l'autre est consacrée à la psychophysique spinoziste et à l'étude des différences entre le parallélisme psychophysique moderne et celui de SPINOZA. L. G.

XVIIIth Century (whole and first half)

B. — *Physical sciences and technology*

Benton, W. A. JOHN WYATT and the weighing of heavy loads. *The Newcomen Society, Transactions*, 9, 60-77, 1 fig., 5 pl., 1928-1929.

JOHN WYATT, 1700-1766. ISIS

Hellman, C. Doris. GEORGE GRAHAM, maker of horological and astronomical instruments. *Vassar Journal of Undergraduate Studies*, 5, 221-51, 1931. ISIS

Reviewed in *Nature*, 128, 435, 1931.

Hine, Muriel. Pedigree of THOMAS NEWCOMEN. *The Newcomen Society, Transactions*, 9, 105-08, 1928-1929. ISIS

Hulme, Edward Wyndham. Statistical history of the iron trade of

England and Wales, 1717-1750. *The Newcomen Society, Transactions*, 9, 12-35, facsim., 1928-1929. ISIS

Pendred, Loughnan St. L. Eulogy upon NEWCOMEN. *The Newcomen Society, Transactions*, 9, 99-101, 1928-1929. ISIS

Smith, Edgar C. THOMAS NEWCOMEN : two hundred years of steam power. *The Newcomen Society, Transactions*, 9, 102-04, pl., 1928-1929. ISIS

C. — *Natural sciences*

Capparoni, Pietro. Sulla patria di GIOVANNI ALFONSO BORELLI. *Riv. di storia d. sc. med. e natur.*, 22, 53-63, 1931. ISIS

On a fait naître BORELLI tantôt à Naples, tantôt à Messine. Il est bien d'origine napolitaine. L. G.

D. — *Medical sciences*

Dorveaux, Paul. Apothicaires membres de l'Académie Royale des Sciences. IV. GILLES FRANÇOIS BOULDUC ; V. ETIENNE FRANÇOIS GEOFFROY. *R. d'hist. de la pharmacie*, 113-26, 1931. ISIS

GILLES FRANÇOIS BOULDUC (1675-1742); ETIENNE FRANÇOIS GEOFFROY (1672-1731).

Halbertsma, Hiddo. Oratio de ALBINI anatomiae tractandae methodo comparata cum ea, quam nostra tempora sibi deposcunt. Leyden, 1848. ISIS

Reviewed by A. W. E. TH. HENSCHEL, *Second Janus*, 2, 494, 1852 ; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Heischkel, Edith. Die Medizinhistoriographie im XVIII. Jahrhundert. 65 p. Leiden, BRILL, 1931. ISIS

Irsay, Stephen d'. ALBRECHT VON HALLER. Eine Studie zur Geistesgeschichte der Aufklärung. *Arbeiten des Instituts für Geschichte der Medizin an der Universität Leipzig*. Band I. 98 p., 5 figs. Leipzig, THIEME, 1930. ISIS

Cette étude sur HALLER met en lumière des opinions du célèbre savant sur des questions diverses. Courte biographie fixant nettement sur la vie intellectuelle de HALLER. Les points suivants ont été traités : I. Les éclaircissements scientifiques. II. Un exposé contradictoire entre HALLER et VOLTAIRE (Idées qu'on a sur le monde et la vie). III. Anatomia animata. IV. Irritabilité. V. Médecine. VI. Botanique et pharmacognosie. VII. Travail d'ensemble. VIII. Conclusion. Une bibliographie et un index complètent cette étude.

L. S.

Mansa, F. V. Die europäische Pest am Anfange des XVIII. Jahrhunderts in Dänemark. *Henschel's Janus*, 3, 111-32, 327-48, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Philipp, J. J. RAYMOND VIEUSSENS's und JOHANN MARIA LANCISI's Verdienste um die Lehre von den Krankheiten des Herzens. *Henschel's Janus*, 2, 580-598, 1847; 3, 316-26, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

E. — *Alia*

Dehérain, Henri. L'orientalisme français en Égypte au XVIII[e] siècle. *Journal des Savants*, 261-72, 1931. ISIS

XVIIIth Century (second half)

B. — *Physical sciences and technology*

Hartog, Sir Philip. JOSEPH PRIESTLEY and his place in the history of science. Lecture delivered at the Royal Institution of Great Britain, on Friday, April 24, 1931. A pamphlet of 36 p., without cover, place, or date. ISIS

Very careful study of PRIESTLEY's electrical and chemical investigations, and of the interrelations between PRIESTLEY's work and LAVOISIER's. PRIESTLEY was apparently the first to suggest, in 1766 or 1767, "that the attraction of electricity is subject to the same laws as that of gravitation, and is therefore according to the squares of the distances..." (his own words). He was also the first to record the oscillatory discharge of the Leyden jar. G. S.

Hulme, E. W. RASTRICK's thrashing machine. *The Newcomen Society, Transactions*, 9, 109-10, 1928-29. ISIS

Lippmann, Edmund O. von. Der Chemiker B. HIGGINS als Zuckerfabrikant um 1800. *Die Deutsche Zuckerindustrie*, 934, 1931. ISIS

C. — *Natural sciences*

Dagan, Marcel. L'enseignement de la botanique à la fin du XVIII[e] siècle. *Le monde des plantes*, Agen, n° 62, 7-8; 63, 2-4; 67, 5-7, 1929-1930. ISIS

Krumbhaar, E. B. The bicentenary of ERASMUS DARWIN and his relation to the doctrine of evolution. *Annals of Medical History*, 3, 487-500, 8 fig., 1931. ISIS

Michaut, G. BUFFON administrateur et homme d'affaires. Lettres inédites. *Annales de l'Université de Paris*, 6, 15-36, 1931. ISIS

Palmer, Howard. Letter dealing with errors in the review of Sir JOSEPH CARRUTHERS's " Captain JAMES COOK," in the *Geographical Journal*. *Geographical Journal*, 77, 491-96, 1931. ISIS

" JOHN LEDYARD's attitude towards Captain COOK was candid and impartial."

Pearl, Raymond. Quotations. An eighteenth century French evolutionist. *Human Biology*, 2, 559-66, facs., 1930. ISIS

Apropos of " Vue philosophique de la gradation naturelle des formes de l'être, ou les essais de la nature qui apprend à faire l'homme " (1768) by JEAN BAPT. RENÉ ROBINET (1735-1820). A. P.

D. — *Medical sciences*

Barbillion. ANTOINE PETIT et la physiologie au XVIII[e] siècle. *Bulletin de la Société Française d'Histoire de la Médecine*, 25, 267-78, 1931.

ANTOINE PETIT, 1718-1794. ISIS

Haldin-Davis. The foundations of British dermatology. *Annals of Medical History*, 3, 368-86, 1931. ISIS

Apropos of ROBERT WILLAN (1757-1812).

Henschel, A. W. E. Th. C. G. GRUNER's (1744-1815) literarischer und persönlicher Charakter. Eine biographische Skizze. *Henschel's Janus*, 1, 823-43, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Hirschel, Bernh. Geschichte des BROWN'schen Systems und der Erregungstheorie. Auch unter dem Titel : Geschichte der medicinischen Schulen und Systeme des 19. Jahrhunderts in Monographien. Nach den Quellen bearbeitet von B. HIRSCHEL. XVI + 296 p. Dresden, ARNOLD, 1846. ISIS

Apropos of JOHN BROWN (1735-1788). Reviewed by H. HAESER, *Henschel's Janus*, 1, 871-72, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Miller, Albert H. The Pneumatic Institution of THOMAS BEDDOES at Clifton, 1798. *Ann. Med. Hist.*, 3, 253-60, 3 illus., 1931. ISIS

BEDDOES (1760-1808), an early enthusiast for preventive medicine, gave HUMPHREY DAVY his scientific start. C. D. L.

Peachey, George C. Two unpublished letters of MATTHEW BAILLIE,

M.D. With annotations. *Annals of Medical History*, 3, 404-06, 1931. ISIS

MATTHEW BAILLIE, 1761-1823.

Tegeler, Ernst. Der Bochumer Arzt Dr. ARNOLD KORTUM, der Dichter der Jobsiade. Sein Leben und sein Wirken. Mit drei Federzeichnungen von HEINZ TEGELER und vier Schriftverzeichnissen. 68 p., illus. Jena, FISCHER, 1931. ISIS

KARL ARNOLD KORTUM, 1745-1824. Jobsiade, 1784. Reviewed by F. M. G. DE FEYFER, *Bijdragen tot de geschiedenis der geneeskunde*, 11, 258, 1931.

E. — *Alia*

Leroy, André. La critique et la religion chez DAVID HUME. (Thèse Paris). XX + 378 p., Paris, ALCAN, 1930. ISIS

« Cette étude, entreprise dans le désir de comprendre l'attitude, si discutée, de HUME à l'égard du problème religieux, pense apporter les résultats suivants: HUME s'est préoccupé tout particulièrement de ce problème qui est, sinon le problème essentiel, du moins l'un des problèmes capitaux qu'il a tenté de résoudre; il s'est arrêté non au scepticisme total, mais à un humanisme qui, à côté de la science, laisse une place à la croyance; par là, il s'est opposé à tous les rationalistes de son époque, déistes ou théologiens, et il annonçait le pragmatisme contemporain."

XIXth Century (whole and first half)

A. — *Mathematics*

Berkeley, L. M. Addition-subtraction logarithms. *United States Naval Institute Proceedings*, 57, 207-09, 1931. ISIS

Apropos of ZECCHINI LEONELLI (1776-1847), the inventor of the so-called Gaussian logarithms, and his Supplément Logarithmique, Bordeaux, 1802. A. P.

Ocagne, Maurice d'. Mathématiciens polytechniciens du XIX^{e} siècle. *R. des questions sc.*, 5-37, juillet, 1931. ISIS

Notes sur vingt-cinq mathématiciens devenus professeurs à l'École Polytechnique, après y avoir été élèves; les plus fameux sont CAUCHY, HERMITE et JORDAN; D'OCAGNE parle également de CHASLES et de POINCARÉ, qui ont l'un et l'autre professé à l'École, mais n'en avaient pas été élèves. L. G.

Schaefer, Clemens. GAUSS's investigations on electrodynamics. *Nature*, 128, 339-41, 1931. ISIS

B. — *Physical sciences and technology*

(Ampère, André-Marie). A la mémoire d'ANDRÉ-MARIE AMPÈRE. *Revue de l'Université de Lyon*, 308-12, 1928. ISIS

« MM. SOSTHÈNE et HERNAND BEHN, deux notables Américains de la Standard Téléphone Laboratory, ont eu la délicate pensée de conserver en propriété collective la maison familiale d'AMPÈRE. Grâce à leur libéralité, la Société française des électriciens acquit le domaine de Poleymieux, son groupe du Sud-Est devant en assurer la gérance. C'est pour consacrer symboliquement la maison au souvenir de l'illustre savant que fut organisée la journée du 2 juin 1928 ». Compte-rendu de cette manifestation commémorative. Texte de l'allocation de M. GHEUSI, recteur de l'Académie de Lyon. Un musée, où l'on rassemblera des documents relatifs à la vie et aux travaux de l'illustre savant sera installé dans la modeste maison de campagne de Poleymieux. J. P.

Ashcroft, E. W. FARADAY. 134 p. London, The British Electrical and Allied Manufacturers Association, 1931. ISIS

Reviewed in *Nature*, 128, 323, 1931.

Berl, E. LIEBIG und die Bittersalz- und Salzsäurefabrik zu Salzhausen (1824-1831). Nach neuen Funden herausgegeben. 65 p. Berlin, Verlag Chemie, 1931. ISIS

Brauner, Bohuslav. The FARADAY festival. *Nature*, 128, 352, 1931. ISIS

Brunet, Pierre. FARADAY and French physicists. *Nature*, 128, 346-48, 1931. ISIS

Davis, Tenney L. SAMUEL GUTHRIE (1782-1848), in commemoration of the centenary of the discovery of chloroform. *Archeion*, 13, 11-23, 1931. ISIS

Le chloroforme fut préparé en 1831 par LIEBIG, SOUBEIRAN et GUTHRIE, mais les premières expériences de GUTHRIE (action de Ca Cl_2 sur l'alcool) semblent bien avoir été antérieures à celles de LIEBIG et de SOUBEIRAN. L.G.

(Faraday). FARADAY celebrations 1931. Supplement of 22 p. to the *Times*, no. 45933, London, Monday, Sept. 21, 1931. ISIS

This splendid special number, perhaps the most impressive tribute ever paid by a great newspaper to a man of science, contains many historical, scientific, and philosophical articles contributed by ROLLO APPLEYARD, WILHELM OSTWALD, Major C. E. S. PHILLIPS, H. MARRYAT, Lord RUTHERFORD, Sir WILLIAM BRAGG, W. F. MAGGIE, Sir J. J. THOMSON, W. M. THORNTON, Sir OLIVER LODGE, THOMAS MARTIN, Sir ROBERT HADFIELD, Sir AMBROSE

FLEMING, W. W. LOCKIE, P. DEBYE, G. MARCONI, Sir RICHARD GREGORY, Sir HUGO HIRST, J. C. MCLENNAN, Sir ALEXANDER ROGER, Col. Sir THOMAS PURVES, ROBERT H. PARSONS, P. ZEEMAN, F. G. DONNAN, etc. It is richly illustrated. The ordinary number of the *Times*, to which this FARADAY number was added as a free supplement, contained also various FARADAY items, e.g., memories of Dr. MICHAEL GRABHAM of Madeira, a note on FARADAY's grave. G. S.

(Faraday). FARADAY centenary exhibition. *Nature*, 128, 564-67, 1931. ISIS

Fellows, Reginald, B. History of the Canterbury and Whitstable railway ; an account of the construction, opening and working of the first passenger railway in the south of England. 94 p., pl., map., front., facs. Canterbury, JENNINGS, 1930. ISIS

Guye, Ch. Eug. FARADAY's connexion with Switzerland and Swiss industrial and economic development. *Nature*, 128, 349-51, 1931. ISIS

James, T. E. RUMFORD and the Royal Institution : a retrospect. *Nature*, 128, 476-81, 2 fig., 1931. ISIS

Jelks, Edward. Doctor JOHN GORRIE, inventor of the first artificial ice machine. *Annals of Medical History*, 3, 387-90, portr., 1931. JOHN GORRIE, 1803-1855. ISIS

Kennelly, A. E. The modern electric age in relation to FARADAY's discovery of electromagnetic induction. *Nature*, 128, 356-59, 1931. ISIS

Marshall, Chapman Frederick Dendy. Centenary history of the Liverpool and Manchester railway : to which is appended a transcript of the relevant portions of RASTRICK's " Rainhill " notebook. IX + 192 p., 20 pl., illus. London, Locomotive Publishing Co., 1930. ISIS

Marshall, Chapman Frederick Dendy. The Rainhill locomotive trials of 1829. *The Newcomen Society, Transactions*, 9, 78-93, 7 pl., 1928-29. ISIS

Meyer, Kirstine. FARADAY and OERSTED. *Nature*, 128, 337-39, 1931. ISIS

Mitkewich, W. Th. FARADAY and electrical science in Russia and the U.S.S.R. *Nature*, 128, 359-62, 1931. ISIS

Przibram, Karl. FARADAY and Austria. *Nature*, 128, 351, 1931. ISIS

Raman, Sir C. V. India's debt to FARADAY. *Nature*, 128, 362-64, 1931. ISIS

Robertson, Sir Robert ; Ellis, B. A. FARADAY's " chemical manipulation." *Nature*, 128, 371-72, 1931. ISIS

Smith, Edgar C. FARADAY and his contemporaries. *Nature*, 128, 333-36, port., 1931. ISIS

Veitch, George Stead. The struggle for the Liverpool and Manchester railway. 68 p., ports., pl. Liverpool, Daily Post Printers, 1930. ISIS

Volterra, Vito. Italian physicists and FARADAY's researches. *Nature*, 128, 342-45, 1931. ISIS

Wayling, H. G. FARADAY's London friends. *Nature*, 128, 482-83, 1931. ISIS

Whitney, Willis R. FARADAY's researches and the United States. *Nature*, 128, 353-56, 1931. ISIS

Zeeman, P. FARADAY's researches on magneto-optics and their development. *Nature*, 128, 365-68, 1931. ISIS

C. — *Natural sciences*

Goddard, T. Russell. History of the Natural History Society of Northumberland, Durham and Newcastle-upon-Tyne, 1829-1929. XIV + 195 p. Newcastle-upon-Tyne, REID, 1929. ISIS

Klaauw, C. J. Van der. Een brief van den theologischen hoogleeraar CLARISSE aan zijn leerling in de natuurlijke historie, den lateren hoogleeraar JAN VAN DER HOEVEN. *Bijdragen tot de geschiedenis der geneeskunde*, 11, 253-56, 1931. ISIS

Lippmann, Edmund O. von. Eine in Vergessenheit gerathene agriculturchemische Abhandlung ALEXANDER VON HUMBOLDT's. *Archeion*, 13, 168-74, 1931. ISIS

L'auteur rappelle une étude trop oubliée de A. DE HUMBOLDT publiée en 1804 dans *Archiv zur Agriculturchemie* sous le titre « Beobachtungen über die Absorption des Sauerstoffes vermittelst der Erden, und Bemerkungen über den Einfluss dieser Operation auf die Ackerbaukunst », et profite de

cette occasion pour attirer l'attention sur les autres travaux de HUMBOLDT relatifs à ce sujet. L. G.

Parson, Sir John H. YOUNG's theory of colour vision. *Nature*, 128. 123, 1931. ISIS

D. — *Medical sciences*

Anderson, Wm. Willis. THOMAS HOLLEY CHIVERS, M.D., 1807-1858. *Annals of Medical History*, 3, 391-93, 1931. ISIS

Barkley, A. H. Dr. SAMUEL BROWN, the first professor of medicine west of the Alleghenies. *Annals of Medical History*, 3, 363-67, portr., frontispiece, 1931. ISIS

SAMUEL BROWN, 1769-1830.

Burr, Harold S. JONATHAN KNIGHT and the founding of the Yale School of Medicine. *Yale Journ. Biol. and Med.*, 1, 327-43, 1931. ISIS

Excellent sketch of early collegiate education at Yale and of early American medical education. JONATHAN KNIGHT (1789-1864) was first lecturer in anatomy and later professor of surgery. Portrait. C. D. L.

Carus, C. G. ADOLPH WILHELM OTTO (1786-1845), über sein Leben und Wirken. Ein Vortrag gehalten in der Gesellschaft für Natur und Heilkunde zu Dresden. *Henschel's Janus*, 1, 691-98, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Chittenden, Russell H. WILLIAM BEAUMONT. *Yale Journal of Biology and Medicine*, 1, 121, 1929. ISIS

WILLIAM BEAUMONT, 1785-1853.

Damon, Samuel Foster. THOMAS HOLLEY CHIVERS, friend of POE, with selections from his poems. A strange chapter in American literary history. XIX + 305 p., 2 portr., facs. New York, HARPER, 1930. ISIS

THOMAS HOLLEY CHIVERS, M.D., 1809-1858.

Falck, C. Ph. Die Geschichte der BRIGHT'schen Krankheit vom Jahre 1827 bis zum Jahre 1847, nach den Quellen bearbeitet. *Henschel's Janus*, 3, 133-53, 456-94, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Incomplete; not continued in the *Second Janus*.

Fayol, Amédée. La vie et l'œuvre d'ORFILA. Préface de LOUIS

MADELIN. 327 p. (Les vies authentiques). Paris, A. MICHEL, 1930. ISIS

MATHIEU JOSEPH BONAVENTURE ORFILA, né à Mahon (Ile de Minorque) le 24 avril, 1787; naturalisé Français en 1818; mort à Paris le 15 mars, 1853. Chimiste, médecin; connu surtout par ses expertises médico-légales. Doyen de la Faculté de médecine de Paris, il apporta dans l'enseignement de nombreuses réformes. Le livre de FAYOL note tout ce qu'eut de romanesque la vie d'ORFILA. L. G.

Finkenrath, Kurt. Die Medizinalreform. Die Geschichte der ersten deutschen ärztlichen Standesbewegung von 1800-1850. IV + 64 p. (*Stud. Gesch. Med.* H. 17), Leipzig, BARTH, 1929. ISIS

Harvey, Samuel C. The education of NATHAN SMITH. *Yale Journ. Biol. and Med.*, 1, 259, portr. 1929. ISIS

Excellent example of how early American medical leaders went to Edinburgh for theory, but to London for facts. NATHAN SMITH (1762-1829) was one of the founders of Yale Medical School (1812), and earlier of Dartmouth Medical School (1797). C. D. L.

Hellman, C. Doris. An unpublished diary of EDWARD JENNER (1810-1812). Edited by C. DORIS HELLMAN. *Annals of Medical History*, 3, 412-38, 6 fig., 1931. ISIS

Heusinger, C. F. Die allgemeine erysipelatose Krankheits-Constitution 1830 bis 1847, in ihrer Akme 1838 bis 1844, und die daraus hervorgegangenen Epidemien in Europa und Amerika. *Henschel's Janus*, 3, 154-65, 525-46, 744-93, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Holtrop, L. S. A. Bibliotheca medico-chirurgica et pharmaceutico-chemica sive Catalogus alphabeticus omnium librorum, dissertationum etc. ad anatomiam, artem medicam, chirurgicam, obstetricam, pharmaceuticam, chemicam, botanicam, physico-medicam et veterinarium pertinentium et in Belgio ab anno 1790 ad annum 1840 editorum cum separatim tum in diariis criticis et actis societatum etc. XVI + 427 + 199 p. The Hague, FUHRI, 1842. ISIS

Reviewed by J. G. THIERFELDER, *Henschel's Janus*, 1, 860-62, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Lebenheim, E. L. H. (1787-1848). E. L. H. LEBENHEIM's Autobiographie mit einer Nachschrift von A. W. E. TH. HENSCHEL. *Henschel's Janus*, 3, 373-84 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Neveu, Raymond. La vie aventureuse de LOUIS FRANK, ancien

médecin du Bey de Tunis, du Pacha de Janina et de l'armée d'Egypte. *Bulletin de la Société française d'Histoire de la Médecine*, 25, 279-94, 1931. ISIS

LOUIS FRANK, 1761-1826.

Rolleston, J. D. JEAN BAPTISTE BOUILLAUD (1796-1881) : a pioneer in cardiology and neurology. *Proc. Roy. Soc. Med.*, 24, 1253-62, portr., 1931. ISIS

Contributions to cardiology : first description of endocardium and of endocarditis; " law of co-incidence " (in most cases of acute febrile articular rheumatism there exists a variable degree of rheumatism of the fibrous tissue of the heart, 1836); accurate cardiac measurements; new physical signs, and description of congenital heart disease. His *Traité clinique des maladies du cœur* appeared in 1835. In neurology he identified the anterior lobes of the brain as the seat of speech. In 1862, President of the Académie de Médecine, and in 1867, of the first international congress of medicine. C. D. L.

Seitz, Franz. Die Typhusepidemie in den Jahren 1813 und 1814 in Bayern. Bruchstück aus einer noch ungedruckten Geschichte des Typhus in Bayern. *Henschel's Janus*, 1, 531-84, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1831. ISIS

Shryock, Richard H. Letters of Dr. RICHARD D. ARNOLD. Historical papers of the Trinity College Historical Society. Double series XVIII + XIX. Durham, N. C., Duke Univ. Press, 1929. ISIS

Reviewed by FRANCIS R. PACKARD, *Annals of Medical History*, 2, 449, 1930.

Shuman, John W. RICHARD DEN's tomb. *Annals of Medical History*, 3, 530-33, 6 fig., 1931. ISIS

Wendt, Alphons. Aus dem Leben des verewigten Geh. M. R. u. Prof. a.d. Univ. Breslau Dr. JOH. WENDT (1777-1845). *Henschel's Janus*, 1, 844-48, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Wiese, E. Robert. GUILLAUME DUPUYTREN. *Medical Life*, 477-94, 1931. ISIS

GUILLAUME DUPUYTREN, 1777-1835.

Wilson, Robert. Dr. J. C. NOTT and the transmission of yellow fever. *Annals of Medical History*, 3, 515-20, 1931. ISIS

E. — *Alia*

Corti, Egon Cesare. La maison ROTHSCHILD. II. L'apogée (1830-

1871) et les temps nouveaux. 470 p., 18 héliogravures, 1 tableau généalogique. Paris, PAYOT, 1930. ISIS

Dans le premier volume, le comte EGON CESARE CORTI rappelait les origines de la famille ROTHSCHILD et de sa prodigieuse fortune. Le fondateur de la maison est MEYER AMSCHEL ROTHSCHILD, de Francfort (1744-1812). Nous avons ici l'histoire de cette famille au cours de la période où elle connut son maximum de puissance et de richesse. Il n'y eut pas d'évènement important auquel elle ne fut mêlée, aussi bien dans le domaine politique que dans le domaine économique : établissement des premiers chemins de fer; efforts en faveur de la paix en 1840; conflits avec LOUIS NAPOLÉON, avec CAVOUR, avec BISMARCK; la guerre de 1870. L. G.

Halévy, Daniel. JULES MICHELET. 197 p. (Les romantiques). Paris, HACHETTE, 1928. ISIS

Maunier, René. BENJAMIN CONSTANT historien des sociétés et des religions. *Revue de l'histoire des religions*, 102, 93-113, 1931. ISIS

BENJAMIN CONSTANT DE REBECQUE (1767-1830).

Niebuhr, Barthold Georg. Die Briefe BARTHOLD GEORG NIEBUHRS. Hrsg. v. DIETRICH GERHARD und WILLIAM NORVIN. Bd. I : 1776-1809. Bd. II : 1809-1816. CXXXIV + 542 p., 8 pl.; XII + 691 p., fig. (*D. Literatur-Archiv*. Hrsg. v. JULIUS PETERSEN. Bd. 1 u. 2.) Berlin, DE GRUYTER, 1926, 1929. ISIS

Reviewed by WALTER GOETZ, *DLZ*, 1, 1297-99, 1930.

Place, Francis. Illustrations and proofs of the principle of population. Being the first work on population in the English language recommending birth control. Now exactly reproduced with an introduction demonstrating FRANCIS PLACE as the founder of the modern birth control movement together with unpublished letters of PLACE on birth control, COLERIDGE's criticisms of MALTHUS's views on birth control. Critical and textual notes by NORMAN E. HIMES. XV + 354 p. London, ALLEN and UNWIN, 1930. ISIS

Reiche, Kurt. AUGUSTE COMTE's Geschichtsphilosophie. 44 p. Tübingen, MOHR, 1927. ISIS

Reviewed by JOACHIM WACH, *Deutsche Literaturzeitung*, 6, 2430-31, 1929.

Ruyer, R. L'humanité de l'avenir d'après COURNOT. *Bibliothèque de philosophie contemporaine*. 150 p., Paris, ALCAN, 1930. ISIS

COURNOT, « qui n'a pas traité ce sujet : l'avenir de l'humanité, directement et particulièrement, y pensait souvent ». Et il l'a traité avec les précautions qu'exige le bon sens, abordant le problème en philosophe, et non en métaphysicien. De citations extrêmement abondantes, l'auteur fait une synthèse

et essaye de montrer que « COURNOT, en prévoyant une humanité raisonnable, active, logique, utilitaire, qui a renoncé au brillant de la politique et de l'histoire pour le solide de l'administration, en croyant ainsi dégager l'élément éternel de la civilisation, prolonge simplement dans l'avenir la ligne des instincts actuels des Européens qui bénéficient passagèrement, à la fois d'un passé économe tout proche, et d'un présent gaspilleur." L. G.

Schrempf, Christoph. SOEREN KIERKEGAARD, eine Biographie. 2 Bde. XVI + 364 + 344 p. Jena, DIEDERICHS, 1927. ISIS

SOEREN AABYE KIERKEGAARD, 1813-1855.

XIXth Century (second half)

A. — *Mathematics*

Pressland, A. J. A. M. LIAPOUNOV, 1857-1918. *Nature*, 128, 138-40, 1931. ISIS

(Tannery, Paul). Lettres inédites de PAUL TANNERY et de H. G. ZEUTHEN. *Archeion*, 13, 49-54, 1931. ISIS

Madame P. TANNERY, avant de publier la correspondance scientifique de son mari, donne dans *Archeion*, une lettre de PAUL TANNERY à H. G. ZEUTHEN et la réponse de celui-ci (1886). L. G.

B. — *Physical sciences and technology*

Casson, Herbert Norton. KELVIN. His amazing life and world wide influence. 259 p., front. London, *Efficiency Magazine*, 1930. ISIS

Dyer, Frank Lewis ; Martin, Thomas Commerford ; Meadowcroft, William Henry. EDISON : His life and inventions. 2 vols., front., illus., pl., ports., facs. New York, HARPER, 1929. ISIS

Feyerabend, Ernst. 50 Jahre Fernsprecher in Deutschland 1877-1927. Herausgegeben vom Reichspostministerium, Berlin. 231 p., ills., ports., facs. Berlin, DECKER, 1927. ISIS

Glasser, Otto. WILHELM CONRAD RÖNTGEN und die Geschichte der Röntgenstrahlen. Mit einem Beitrag : Persönliches über W. C. RÖNTGEN, von MARGARET BOVERI. XI + 337 p. 96 fig., port. (*Röntgenkunde in Einzeldarstellungen*, hrsg. von H. H. BERG und H. FRIK, Bd. 3). Berlin, SPRINGER, 1931. ISIS

Lagrange, E. Le pendule de FOUCAULT au duomo de Florence. *Ciel et Terre*, 46, 19-27, 1930 ISIS

Swinton, Alan Archibald Campbell. Autobiographical and other writings. IX + 181 p., 18 pl. London, LONGMANS, 1930. ISIS

Reviewed in *Nature*, 126, 89-90, 1930.

Zenneck, Jonathan Adolf Wilhelm. HEINRICH HERTZ. Rede bei der HEINRICH HERTZfeier der Universität Bonn am 19. Nov. 1927. 36 p., 13 fig. (*Deutsch. Mus., Abh. u. Ber.* 1, Heft 2.) Berlin, VDI Verlag, 1929. ISIS

C. — *Natural sciences*

Andrée, Salomon August; Strindberg, Nils; Fraenkel, Knut. The ANDRÉE diaries, being the diaries, records, and memoranda of S. A. ANDRÉE, NILS STRINDBERG, and KNUT FRAENKEL written during their balloon expedition to the North Pole in 1897 and discovered on White Island in 1930, together with a complete record of the expedition and discovery. Authorized translation from the official Swedish edition by EDWARD ADAMS-RAY. XX + 471 p. London, LANE, 1931. ISIS

Reviewed by A. R. HINKS, *Geographical Journal*, 77, 362-66, 1931.

Bateson, William (1861-1926). MENDEL'S principles of heredity. Fourth impression. XIV + 413 p., figs., 6 pl. Cambridge, University Press, 1930. ISIS

Reviewed by CARL CORRENS, *DLZ*, 2, 40-42, 1931.

Cherrie, George Kruck. Dark trails. Adventures of a naturalist. XVI + 322 p., front., pl., map. London, PUTNAM, 1930. ISIS

Dickinson, B. B. Reminiscences. *Geography*, 16, 1-10, 1931. ISIS

An account of the teaching of geography in England from 1869 to 1896. C. W. A.

Hast, Theodore H. MAX JOHANN SIGISMUND SCHULTZE (1825-1874). *Annals Med. Hist.*, 3, 166-78, port., 1931. ISIS

Authoritative survey of the scientific work of the reviser of the cell theory and the founder of the *Archiv für Mikroskopische Anatomie* (1885). Bibliography. C. D. L.

Livingstone, William Pringle. The story of DAVID LIVINGSTONE. 161 p., front. London, Livingstone Press, 1930. ISIS

Loudon, William James. A Canadian geologist. VII +257 p. London, MACMILLAN, 1931. ISIS

Osborn, Henry Fairfield ; Warren, Helen Ann. COPE, master naturalist : the life and letters of EDWARD DRINKER COPE, with a bibliography of his writings classified by subject ; a study of the pioneer and foundation periods of vertebrate palaeontology in America. Citations from the writings of GEORGE BROWN GOODE, THEODORE GIEL, PERSIFOR FRAZER, HENRY FAIRFIELD OSBORN, WILLIAM BERRYMAN SCOTT, WILLIAM KING GREGORY, WILLIAM DILLER MATTHEW. Illustrations by CHARLES R. KNIGHT. XVI + 740 p., 24 pl. Princeton, University Press, 1931. ISIS

EDWARD DRINKER COPE, 1840-1897.

Raignier, A. (S.J.). Le père ERICH WASMANN (S. J.) (1859-1931). *R. des questions sc.*, 361-73, mai 1931. ISIS

ERICH WASMANN (29 mai, 1859-10 fevr., 1931). Entomologie, psychologie animale.

(Temple, Sir Richard Carnac). Obituary notice of Sir RICHARD CARNAC TEMPLE, Bart., C. B., C. I. E. (1850-1931). *Geographical Journal*, 77, 591, 1931. ISIS

" The recognized authority on the Andaman Islands and their people. For forty-six years editor of the *Indian Antiquary*. Vice president of the Hakluyt Society."

Wordie, J. M. Obituary notice of Captain OTTO SVERDRUP (1854-1930). *Geographical Journal*, 77, 94-95, 1931. ISIS

NANSEN's second in command in Greenland and *Fram* expeditions. In command of the *Fram*'s later four year voyage in the Canadian Arctic. " SVERDRUP's expedition uncovered new land of almost greater area than all the combined discoveries of the FRANKLIN search expeditions."

C. W. A.

D. — *Medical sciences*

Bertrand, François Louis. ALFRED BINET et son œuvre. Préface de H. PIÉRON. 336 p., portr. Paris, ALCAN, 1930. ISIS

ALFRED BINET (1857-1911); psychologie individuelle, psychologie expérimentale, emploi des tests comme méthode de contrôle pédagogique et d'investigation psychologique, aboutissant à l'échelle métrique du niveau mental. L'ouvrage de F. L. BERTRAND, présenté en thèse de doctorat ès-lettres, donne, après quelques pages de biographie, un exposé détaillé de l'œuvre de BINET, et retrace, en même temps que sa vie, l'évolution de sa pensée. Bibliographie complète des travaux de BINET. L. G.

Bland-Sutton, Sir John. The story of a surgeon . With a preamble by RUDYARD KIPLING. XII + 204 p. London, METHUEN, 1930. ISIS

Dawson, W. T. Cinchona alkaloids and bark in malaria. *J. Roy. Army Med. Corps*, 56, 178-201, 1931. ISIS

An interesting detail added here to the well known history of cinchona refers to a sound but neglected evaluation of the chief cinchona alkaloids by a commission of the Madras Presidency organized in 1866. C. D. L.

Franchini, Joseph. CH. ALPHONSE LAVERAN, 1845-1922 : his life and works. *Ann. Med. Hist.*, 3, 280-88, portr., 3 illus., 1931. ISIS

Delightful address by a distinguished pupil at the dedication of a memorial to LAVERAN in Algeria on the occasion of the fiftieth anniversary of the discovery of the malarial parasite in the Military Hospital of Constantine. C. D. L.

Genty, Victor. Un grand biologiste, CHARLES ROBIN (1821-1885) ; sa vie, ses amitiés philosophiques et littéraires. 144 p., 2 portr. Lyon, A. REY, 1931. ISIS

Biographie très vivante, parce qu'écrite avec beaucoup de sympathie, du fondateur de la Société de Biologie (mai 1848, avec F. A. E. FOLLIN et HOUEL). En 1847, CHARLES PHILIPPE ROBIN est agrégé de la faculté de Paris, en 1862 professeur d'histologie ; l'Académie de médecine lui ouvre ses portes en 1858, l'Académie des sciences en 1866. Pendant la guerre de 1870-71, il est chargé de diriger les services médicaux de l'armée, dont la direction était auparavant dans les mains de l'intendance. Disciple d'AUGUSTE COMTE, il fonde avec LITTRÉ (1871) la Société de sociologie pour l'application de la méthode positive et scientifique à l'étude des doctrines sociales, société qui n'eut d'ailleurs qu'une existence éphémère. Voici la liste de ses principaux ouvrages : Du microscope et des injections dans leurs applications à l'anatomie (1851) ; Traité de chimie anatomique et physiologique (3 vol. avec atlas, 1852) ; Dictionnaire de médecine (1855, en collaboration avec LITTRÉ, II[e] éd. 1858) ; Leçons sur les substances organisées et leurs altérations (1866) ; Leçons sur les humeurs (1867) ; Traité d'anatomie et de physiologie cellulaires (1873) ; Nouveau dictionnaire abrégé de médecine (1885). L'auteur relève ses relations amicales avec MÉRIMÉE, TAINE, RENAN, SAINTE-BEUVE, MICHELET, ABOUT, A. DUMAS fils, les GONCOURT, GUSTAVE DORÉ. L. G.

Kerbosch, M. Cinchona culture in Java : its history and development. *Geneesk. Tijdsch. v. Nederl. Indie*, 71, 317-44, 5 illus., 1931. ISIS

WEDDELL who visited the cinchona districts in 1848 suggested introducing the plant to other countries to prevent its extirpation. A Dutch expedition under HASSKARL took plants to Java in 1852, and Sir CLEMENTS MARKHAM took *C. succirubra* to India to 1860. But the quinine yield was low until stock was grafted from seeds obtained from CHARLES LEDGER (refused by the English and bought by the Dutch). The Dutch government, through the Cinchona Agreement (1913), now regulates the industry. C. D. L.

(Kitasato, Shibasaburo). The passing of KITASATO. *Medical Life*, 519-20, port., 1931. ISIS

(Kober, George Martin). Reminiscences of GEORGE MARTIN KOBER. Vol. 1. Georgetown University, Washington, D.C., 1930. ISIS

Lane, John E. WILLIAM H. CARMALT. *Yale Journ. Biol. and Med.*, 2, 89-113, 1929. ISIS

Bibliography, with two portraits, of CARMALT (1836-1929), professor of ophthalmology and later of surgery, at Yale. C. D. L.

Newsholme, Sir Arthur. The story of modern preventive medicine; being a continuation of the Evolution of preventive medicine, 1927, by Sir ARTHUR NEWSHOLME. XII + 295 p., illus. Baltimore, WILLIAMS & WILKINS, 1929. ISIS

Reid, Edith Gittings. The great physician : a short life of Sir WILLIAM OSLER (1849-1919). 299 p. Oxford, University Press, 1931. ISIS

Sequiera, James H. ALPHONSE LAVERAN and his work. *Kenya and East Afr. Med. J.*, 6, 319-30, 1 fig., 1930. ISIS

CHARLES LOUIS ALPHONSE LAVERAN, 1845-1922.

Sieur. Un chirurgien militaire avant et après LISTER (Le médecin-inspecteur CHAUVEL, membre de l'Académie de Médecine). *Bulletin de la Société Française d'Histoire de la Médecine*, 25, 303-25, 1931. ISIS

JULES FIDÈLE MARIE CHAUVEL, 1841-1908.

Unger, Helmuth. Helfer der Menschheit. Der Lebensroman ROBERT KOCHS. 350 p., 1 pl. Leipzig, Buchhandlg. d. Verbands d. Ärzte Deutschlands, 1929. ISIS

Wiese, E. Robert ; Gilbert, Judson E. THEODORE KOCHER (1841-1917). *Annals of Medical History*, 3, 521-29, portr., 1931. ISIS

E. — *Alia*

Armaingauld, A. Quelques mots de souvenir sur LITTRÉ. *Rev. polit. et parlementaire*, 148, 304-07, 1931. ISIS

Le docteur ARMAINGAULT, qui a quelque peu été le secrétaire de LITTRÉ de 1861 à 1867, révèle que LITTRÉ, bien qu'il n'eut aucune lésion cardiaque, avait le cœur syncopal depuis l'âge de 19 ans, les crises d'arrêt du cœur se manifestant d'ailleurs très rarement, et étant assez courtes pour que LITTRÉ put reprendre son travail environ deux heures après la crise. L. G.

Comte, Auguste. Extraits inédits de sa correspondance avec CÉLESTIN DE BLIGNIÈRES. *Rev. philos.*, 161-94, sept.-oct., 1931. ISIS

La correspondance de COMTE avec son disciple C. DE BLIGNIÈRES (1823-

1905) s'étend du 11 octobre 1849 au 27 juin 1857; à cette date, deux mois et demi avant sa mort, COMTE rompit avec DE BLIGNIÈRES, dont la docilité lui semblait insuffisante, et dont il ne put accepter l'*Exposition abrégée et populaire de la philosophie et de la religion positives* (Paris, 1857). Toutes ces lettres vont être prochainement, in extenso, publiées dans la collection des textes philosophiques (VRIN, éditeur). L. G.

Koopman, J. BEDRICH SMETANA (1824-1884). Geneeskundig-muziekhistorische studies. VI. *Bijdragen tot de geschiedenis der geneeskunde*, 11, 247-52, 1931. ISIS

A physician looks at the composer.

Moguel, Maurice. ADOLF VON HARNACK, 9 mai 1851-10 juin 1930. *Revue de l'histoire des religions*, 102, 123-28, 1931. ISIS

Neumann, Carl. JACOB BURCKHARDT. 402 p. München, BRUCKMANN, 1927. ISIS

Reviewed by KLAUS BERGER, *Deutsche Literaturzeitung*, 49, 1249-53, 1928.

XXth Century

B. — *Physical sciences and technology*

Dopp, H. J. G. HAGEN (S. J.) *Revue des questions scientifiques*, 99, 5-37, 204-31, 1931. ISIS

Biographie et examen des travaux de JOHANN GEORG HAGEN (1847-1930), directeur de l'observatoire du Vatican de 1906 à sa mort : enregistrement photographique du passage d'une étoile au méridien, recherches expérimentales sur la rotation de la terre, travaux sur les étoiles variables, sur les nuages cosmiques. L. G.

Fortescue, John. The Royal Army Service Corps: a history of transport and supply in the British Army. Volume 1. R.A.S.C. Record Office. Printed at the Cambridge University Press, 1930. ISIS

Frank, Philipp. Der Charakter der heutigen physikalischen Theorie. *Scientia*, 49, 183-96, 1931; traduction française, *ibid.*, supplément, 74-84. ISIS

Goldstrom, John. A narrative history of aviation. XII + 319 p., 32 pl. New York, MACMILLAN, 1930. ISIS

C. — *Natural sciences*

Akeley, Mary L. Jobe. CARL AKELEY'S Africa. The account of the AKELEY-EASTMAN-POMEROY African Hall Expedition of the American

Museum of Natural History. Foreword by HENRY FAIRFIELD OSBORN. XX + 322 p., illus., maps. London, GOLLANCZ, 1931. ISIS

Reviewed by C. W. HOBLEY, *Geographical Journal*, 77, 573-74, 1931. "CARL AKELEY probably did more for taxidermy than any previous worker in the field. He was a great artist; he invariably studied the animal in the life in its natural surroundings; and he made meticulous measurements immediately after the death of the animal, photographed the environment, and even collected the actual plant life of its habitat." First edition in America, 1929.

Amundsen, Roald. Mein Leben als Entdecker. Übersetzt von GEORG SCHWARZ. 302 p. Wien, 1929. ISIS

Andrews, Roy Chapman. Ends of the earth. With 67 illustrations from photographs. New York, PUTNAM'S, 1929. ISIS

Reviewed in *Natural History*, p. 220, 1930.

Cherry-Garrard, Apsley. The worst journey in the world. Antarctic, 1910-1913. With maps and illustrations by EDWARD A. WILSON and other members of the expedition. Second edition. In two volumes. Vol. I, LXIV + 300 p.; Vol. II, VIII + 285 p. London, CONSTABLE, 1930. ISIS

Davies, A. M. Obituary notice of Dr. JOHN WILLIAM EVANS (1857-1930). *Geographical Journal*, 77, 207-08, 1931. ISIS

Mineralogist to the Imperial Institute, 1904-1913, lecturer in geology at Birkbeck College, 1906-1920, and lecturer in petrology at the Royal College of Science, 1912-1927. President of the Geological Society, London, 1924-1926. C. W. A.

Gwynn, Stephen Lucian. Captain ROBERT FALCON SCOTT. IX + 240 p., front., pl., portr., map, facs., (*The Golden Hind* series; ed. by M. WALDMAN). London, LANE, 1929. ISIS

Hinks, A. R. Obituary notice of ALFRED ERNEST YOUNG (1869-1930). *Geographical Journal*, 77, 303-04, 1931. ISIS

His work on map projections "culminated at the end of 1929 in his discovery of what he believed to be the most general form of orthomorphic projection with average error a minimum."

Joyet-Lavergne, Ph. Les théories métaboliques et la théorie physico-chimique de la sexualité. *Scientia*, 49, 197-206, 1931. ISIS

Leriche, Maurice. JULES CORNET. *Le Flambeau*, 145-59, 1931. ISIS

« L'œuvre de JULES CORNET peut se résumer en quelques mots. Il a parachevé, dans le Hainaut, l'édifice construit par son père F. L. CORNET, et par A. BRIART. Il a écrit l'harmonieuse histoire des rivières belges. Il a jeté les bases de la géologie du Congo, et cette dernière œuvre assure à son nom l'éclat réservé à ceux qui furent des fondateurs. »

FRANÇOIS LÉOPOLD CORNET, 1834-1887.
JULES CORNET, 1865-1929.

Nobile, Umberto. " L'Italia " al Polo Nord. Con 172 illustrazioni e grafici e due carte fuor di testo. XI + XV + 475 p. Milan, MONDADORI, 1930. ISIS

Nobile, Umberto. Die Vorbereitungen und die wissenschaftlichen Ergebnisse der Polarexpedition der *Italia*. Übersetzt von W. J. VAN DER STAY. 98 p., 5 pl., 39 fig. Gotha, 1929. ISIS

Nobile, Umberto. With Italia to the North Pole. English translation by FRANK FLEETWOOD. 358 p., pl., portr., 2 maps. London, ALLEN and UNWIN, 1930. ISIS

Rabaud, Etienne. CHARLES JULIN (1857-1929). *Bull. biol. France-Belgique*, 64, I-VII, portr., 1930. ISIS

Roosevelt, Kermit. The search for the giant Panda. The story of the first expedition ever to collect the strange raccoon bear near the border of Tibet. How the Field Museum Expedition obtained the first specimen of the rare Beishung, an animal never before seen by white men. With photographs by SUYDAM CUTTING and KERMIT ROOSEVELT. *Natural History*, 30, 3-16, ills., 1930. ISIS

Skelton, Reginald William. Obituary of Vice-Admiral Sir CHARLES WILLIAM REWSON ROYDS (1876-1931). *Geographical Journal*, 77, 206-07, 1931. ISIS

During SCOTT's Antarctic expedition of 1902-03, ROYDS made three journeys to the emperor penguin rookery, and brought back valuable observations of the emperor penguins, their chicks, and the first authentic eggs.

C. W. A.

Vickery, Hubert Bradford. THOMAS BURR OSBORNE. *Yale Journal of Biology and Medicine*, 1, 187, 1929. ISIS

T. B. OSBORNE (1859-1929) was one of the leaders in developing biochemistry in America. His work on proteins and vitamines was outstanding. Portrait.

C. D. L.

Whitehouse, John Howard. NANSEN : a book of homage. 189 p., pl., 2 portr., map. London, HODDER and STOUGHTON, 1930. ISIS

D. — *Medical sciences*

Eckstein, Gustav. NOGUCHI. IX + 419 p., 13 illus. New York, HARPER, 1931. ISIS

Very popularized biography, reading like an expanded chapter in DE KRUIF's *Microbe Hunters* (1926). HIDEYO NOGUCHI, born a peasant's son in Okinajima, Japan, in 1876, came to Philadelphia in 1900. In 1910, at the Rockefeller Institute for Medical Research, he first cultured *Treponema pallidum*. Later he studied infectious jaundice, Oroya fever, Rocky Mountain spotted fever, trachoma, and yellow fever. Of the latter he died at Acera, Africa, in 1928, a martyr to his scientific zeal. C. D. L.

MacCallum, William George. WILLIAM STEWART HALSTED, surgeon. Introduction by W. H. WELCH. XVIII + 241 p., 15 pl., Baltimore, The Johns Hopkins Press, 1930. ISIS

Reviewed by FRANCIS R. PACKARD, *Annals of Medical History*, 3, 460-62, 1931.

Macht, David I. LOUIS LEWIN (1850-1929) : pharmacologist, toxicologist, medical historian. *Ann. Med. Hist.*, 3, 179-94, portr., 1931. ISIS

An appended bibliography of 227 titles gives some idea of the extraordinary activities of this versatile scientist, denied, so it is said, a university appointment in Germany because of his orthodoxy. Especially noteworthy are his important monographs on toxicology, among which may be mentioned *Die Gifte in der Weltgeschichte*, Berlin, SPRINGER, 1920. C. D. L.

Peters, John P. ALFRED MAURICE WAKEMAN. *Yale Journal of Biology and Medicine*, 1, 191, 1929. ISIS

Biobibliographical obituary notice. Born 1897, WAKEMAN's promising medical research career was terminated by an obscure malady contracted in Nigeria, Africa, whither he had been sent to study yellow fever. C. D. L.

Pottle, Frederick Albert. Stretchers, the story of a hospital unit on the Western Front. XVI + 366 p. New Haven, Yale Univ. Press, 1929. ISIS

Reviewed by FRANCIS R. PACKARD, *Annals of Medical History*, 2, 129-30, 1930.

Schweitzer, Albert. Selbstdarstellung. 44 p., portr. Leipzig, MEINER, 1929. ISIS

Ward, Ernest. Medical adventure : some experiences of a general practitioner. XII + 291 p. London, BALE, 1929. ISIS

E. — *Alia*

Cressy, Edward. Discoveries and inventions of the twentieth century. Third edition. Revised and enlarged. Profusely illustrated. XXI + 476 p. London, ROUTLEDGE, 1930. ISIS

Jankélévitch, V. BERGSON. VIII + 300 p. Collect. *Les grands philosophes*. Paris, ALCAN, 1931 (45 fr.) ISIS

« On a voulu non pas tant exposer le bergsonisme que le faire comprendre... On a jugé que l'étude d'une doctrine contemporaine, et si profondément engagée dans la vie intellectuelle de notre pays, n'exigeait pas une méthode aussi historique que l'étude des doctrines anciennes. S'agissant d'un écrivain de notre langue et encore mêlé à l'actualité philosophique, il n'y a aucun mérite spécial à exposer clairement des idées connues de tous : ici, pas de sources à découvrir, pas de problèmes philosophiques à discuter. On ne s'étonnera donc point si le commentaire et l'interprétation critique tiennent dans cet ouvrage une place scandaleusement grande. Nous devons dire, pour terminer, que ce livre n'est pas, malgré les apparences, une apologie du bergsonisme. » (Extrait de la préface de l'auteur.)

Rayleigh, Lord **(Robert John Strutt).** Lord BALFOUR in his relation to science. VIII + 46 p. Cambridge, University Press, 1930. ISIS

Wahl, Jean. La philosophie spéculative de WHITEHEAD. *Rev. philos.*, 341-78, mai-juin ; 108-43, juillet-août, 1931. ISIS

PART II

HISTORICAL CLASSIFICATION

Including only the items which could not be included in Part I—the fundamental (centurial) classification. Hence a student of Muslim science, for example, should not peruse simply the notes collected below under the heading "Islam," he should examine as well those included above under the headings VIIth century, VIIIth century, etc.

I. ANTIQUITY

1. — ANTIQUITY (*generalities*)

Andreades, A. La mort de Sparte et ses causes démographiques. *Metron*, 9, 99-105, 1931. ISIS

Baumann, E. D. An antique physiological problem. *Ann. Med. Hist.*, 3, 21-26, 1931. ISIS

Concerning a common lay and even medical opinion of ancient Greece and Rome that a certain part, at least, of what a person drinks passes to the lungs. C. D. L.

Benz, Ernst. Das Todesproblem in der stoischen Philosophie. 130 p. (*Tübinger Beitr. z. Altertumswissensch.*) Stuttgart, KOHLHAMMER, 1929. ISIS

Breasted, James Henry. Al-'uṣûr al-qadîma. Arabic translation of " Ancient times " by DÂ'ÛD QURBÂN. Second edition revised. XVIII + 616 p., 225 fig. Beirut, American Press, 1930. ISIS

It gave me great pleasure to find that BREASTED's excellent textbook on ancient history had been translated into Arabic. The translation was made in 1926, under the editorial guidance of HAROLD NELSON, then professor of ancient history in the American University of Beirut. Indeed the original text prepared to meet the needs of American students had to be somewhat revised, by addition and subtraction, to meet the very different needs of oriental students. The publication of this Arabic translation was especially welcome because Arabic speaking students—and not only Muslim ones—either misunderstand pre-Islamic times or else ignore them altogether. It takes much pains to make them appreciate the intellectual achievements of the period of al-jâhiliyya (or al-jâhiliyya al-jahlâ' !). The first edition was very well received in the East, being at once sponsored by the departments of education of 'Iraq, Palestine, and Transjordania. This second edition has been considerably improved in the details : some paragraphs and figures have been added, also an elaborate index (58 p.). The figures are the same as in the English edition, the same plates having been used whenever possible. It is at once a very useful and a very handsome publication which does credit to all concerned. G. S.

Cary, Max ; Warmington, E. H. The ancient explorers. IX + 270 p., maps. London, METHUEN, 1929. ISIS

Cavaignac, Eugène. Le monde Méditerranéen jusqu'au IV^e^ siècle avant J.-C. VII + 706 p. (*Histoire du Monde*, volume 2.) Paris, DE BOCCARD, 1929. ISIS

Reviewed by ALLAN CHESTER JOHNSON, *American Historical Review*, 35, 828-30, 1930.

Ciccoti, Ettore. Il problema demografico nel mondo antico. *Metron*, 9, 111-65, 1931. ISIS

(Crete). Ecole française d'Athènes. Etudes crétoises : I. Fouilles exécutées à Mallia, premier rapport (1922-1924), par F. CHAPOUTHIER et J. CHARBONNEAUX ; II. Mallia, écritures minoennes, par CHAPOUTHIER. 2 vols. II + 65 p., 36 pl., 19 fig. ; XII + 99 p., 8 pl., 36 fig. Paris, GEUTHNER, 1928. ISIS

Reviewed by A. MERLIN, *Journal des Savants*, 241-51, 1 fig., 1931.

Landsberg, M. Historische Untersuchung über den Morbus cardiacus der Alten. *Henschel's Janus*, 2, 53-124, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Lasaulx, Ernst v. Die Geologie der Griechen und Römer. Ein Beitrag zur Philosophie der Geschichte (richtiger: zur Geschichte der Naturphilosophie) von ERNST V. LASAULX. Aus den *Abhandlungen der kön. bayer. Akademie der Wissenschaften* besonders abgedruckt. 52 p. München, FRANZ, 1851. ISIS

Reviewed by J. G. THIERFELDER, *Second Janus*, 2, 645-49, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Neuburger, Albert. The technical arts and sciences of the ancients. Translated by HENRY L. BROSE. XXXII + 518 p. London, METHUEN, 1930. ISIS

Nussbaum, John. PAUL TANNERY et l'histoire des physiologues milésiens. Etude critique. VII + 126 p. Thèse Lausanne. Impr. La Concorde, 1929. ISIS

« Décrire la méthode proposée par TANNERY, commenter quelques-unes des thèses nouvelles de son ouvrage capital, *Pour l'histoire de la science hellène*, tel est le but que nous nous sommes fixé ». L'auteur fait d'abord une histoire de l'histoire de la philosophie présocratique jusqu'à TANNERY (pp. 16-51); il examine ensuite la méthode de TANNERY (52-60), puis étudie d'une façon plus développée trois points particuliers : les Milesiens étaient-ils des philosophes ou des physiologues ? Quelle a été l'influence de l'Orient sur les origines de la pensée hellène ? (Dans ces deux cas, il adopte intégralement les conclusions de TANNERY). Enfin, le problème que pose l'*Απειρον* d'ANAXIMANDRE. (Il conclut à une faute d'interprétation de TANNERY.) L. G.

Swindler, Mary Hamilton. Ancient painting from the earliest times to the period of Christian art. XLV + 488 p., pl., front., illus., maps. New Haven, Yale University Press, 1929. ISIS

Thierfelder, J. G. Ueber das Nitrum der Alten. Mit besonderer Berücksichtigung des gleichnamigen Aufsatzes von Dr. HARLESS. *Henschel's Janus*, 3, 29-53, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

The paper by J. C. F. HARLESS appeared in *Henschel's Janus*, 1, 455-84, 1846.

Trowbridge, Mary Luella. Philological studies in ancient glass.

206 p. (*University of Illinois studies in language and literature*, vol. 13, p. 239-436). Urbana, Illinois, 1928. ISIS

Reviewed by ADRIEN BLANCHET, *Journal des savants*, 180-81, 1930.

2. — EGYPT

Brunton, Guy. Qau and Badari. I. With chapters by ALAN GARDINER and FLINDERS PETRIE. VIII + 89 p., 49 pl. ; II : IV + 29 p., pl. 50-104. (British School of Archaeology in Egypt and Egyptian Research Account 29th year 1923). London, British School of Archaeology in Egypt, 1927-28. ISIS

Reviewed by A. SCHARFF, *OLZ*, 33, 986-88, 1930.

Chace, Arnold B. The Egyptian fraction reckoning. *Archeion*, 13, 40-41, 1931. ISIS

Vide infra, VOGEL, KURT. CHACE et VOGEL discutent la question de savoir si les Egyptiens possédaient ou non le concept de fraction générale. CHACE tient pour la négative, VOGEL pour l'affirmative. L. G.

Elsberg, Charles A. The Edwin Smith surgical papyrus and the diagnosis and treatment of injuries to the skull and spine 5000 years ago. *Ann. Med. Hist.*, 3, 271-79, 1931. ISIS

Evers, Hans Gerhard. Staat aus dem Stein. Denkmäler, Geschichte und Bedeutung der ägyptischen Plastik während des Mittleren Reiches. Bd. I : 117 p., 29 fig., 148 pl. Bd. II : Die Vorarbeiten, III + 132 p. ,16 pl. München, BRUCKMANN, 1929. ISIS

Reviewed by HANS BONNET, *OLZ*, 33, 180-85, 1930.

Lutz, Henry Frederick. Egyptian statues and statuettes in the Museum of Anthropology of the University of California. 31 p., 42 pl., 30 fig. (*Univ. of California Publications. Egyptian Archaeology*, vol. V). Leipzig, HINRICHS, 1930. ISIS

Reviewed by A. SCHARFF, *DLZ*, 2, 1807-10, 1931.

Meyerhof, Max. LUDWIG KEIMER's Beiträge zur Naturgeschichte Altägyptens. *Archeion*, 13, 201-08, 1931. ISIS

L. KEIMER, disciple de ERMAN, MÖLLER et GEORGE SCHWEINFÜRTH, était naturaliste en même temps que philologue; sa contribution à l'étude de la flore et de la faune de l'Egypte ancienne est considérable. (*Isis*, 8, 581 ; 9, 16 180; 11, 215; 14, 509; 15, 438). L. G.

Murray, Margaret Alice. Egyptian temples. London, LOW, 1931. ISIS

Neugebauer, O. Die Geometrie der ägyptischen mathematischen Texte. *Quellen und Studien zur Gesch. d. Math., Astronomie und Physik*, Abt. B : Studien, 1, 413-51, 27 fig., 1931. ISIS

Neugebauer, Otto. Zum Moskauer mathematischen Papyrus. *Quellen und Studien zur Gesch. d. Math., Astronomie und Physik*, Abt. B : Studien, 1, 541, 2 fig., 1931. ISIS

Pendlebury, John Dewitt Stringfellow. Aegyptiaca. A catalogue of Egyptian objects in the Aegean area. With a foreword by H. R. HALL. XIX + 121 p., 5 pl., 3 maps. Cambridge, University Press, 1930. ISIS

A catalogue of all the Egyptian objects found in the Aegean area down to the close of the XXVIth Dynasty. The author has spent two years in Greece and has lately been excavating in Egypt. All the objects are carefully dated, and the maps are intended to show both the distribution of Egyptian objects in the Aegean, and of objects from the Aegean in Egypt.

Sachs, Curt. Die Musikinstrumente des alten Aegyptens. (*Mitteilungen der Aegyptischen Sammlung*, Bd. III). Berlin, CURTIUS, 1931. ISIS

Sandford, K. S.; Arkell, W. J. Prehistoric survey of Egypt and Western Asia. Vol. 1 : Paleolithic man and the Nile-Faiyum Divide ; a study of the region during Pliocene and Pleistocene times. XV + 77 p., 11 pl. (*University of Chicago Oriental Institute Publications*, 10). Chicago, University Press, 1931. ISIS

Reviewed by A. S. W., *Nature*, 128, 287-88, 1931.

Scharff, Alexander. Die Altertümer der Vor- und Frühzeit Aegyptens. 2 vols., ill., 74 pl. (*Mitteilungen aus der Aegyptischen Sammlung der Staatlichen Museen zu Berlin*, Bd. IV and V). Berlin, CURTIUS, 1931. ISIS

Vogel, Kurt. Zur Aegyptischen Bruchrechnung. *Archeion*, 13, 42-44, 1931. ISIS

Vide supra, CHACE, A. B.

Waddell, Laurence Austine. Egyptian civilization : its Sumerian origin and real chronology, and Sumerian origin of Egyptian hieroglyphs. XX + 223 p., 21 pl., 11 maps. London, LUZAC, 1930. ISIS

Weber, Wilh. Die aegyptisch-griechischen Terrakotten. Beiträge zur Religions- und Kulturgeschichte. Two vols. 618 fig. (*Mit-*

teilungen der Aegyptischen Sammlung, Bd. II). Berlin, CURTIUS, 1931. ISIS

3. — BABYLONIA AND ASSYRIA

Chiera, Edward. Sumerish lexical texts from the Temple School of Nippur. XII + 20 p., 126 pl. (*The University of Chicago Oriental Institute Publications*, vol. 11 : Coneiform series, vol. 1.) Chicago, University Press, 1929. ISIS

Ebeling, Erich ; Meissner, Bruno. Reallexikon der Assyriologie. Band 1, Lieferung 4. p. 241-320. Berlin, DE GRUYTER, 1930. ISIS

Hall, Harry Reginald. A season's work at Ur, al-'Ubaid, Abu Shahrain (Eridu) and elsewhere : being an unofficial account of the British Museum Archeological Mission to Babylonia, 1919. XXIV + 300 p., 277 illus., map. London, METHUEN, 1930. ISIS

Reviewed by S. R. K. GLANVILLE, *Nature*, 128, 131-32, 1931 ; by A. CONWAY, *Geographical Journal*, 77, 377, 1931. " In four months he laid the foundations for Mr. WOOLLEY's further work at Ur, found a new and important site at Al 'Ubaid, and uncovered houses in Eridu. Few men have had the thrill of starting work on so remunerative a site. There are 276 excellent maps, plans, and photographs. "

Macnaughton, Duncan. A scheme of Babylonian chronology : from the flood to the fall of Nineveh ; with notes thereon, including notes on Egyptian and Biblical chronology. XII + 189 p. London, LUZAC, 1930. ISIS

Neugebauer, O. Sexagesimalsystem und babylonische Bruchrechnung, II und III. *Quellen und Studien zur Geschichte der Mathematik, Astronomie und Physik*, Abt. B : Studien, 1, 452-57, 458-63, 1931. ISIS

The first part of this paper appeared *ibid.*, 183-93.

San Niccolò, M. ; Ungnad, A. Neubabylonische Rechts- und Verwaltungsurkunden. Übersetzt und erläutert. Band 1, Hefte 1 und 2. Leipzig, HINRICHS, 1929. ISIS

Reviewed by C. J. GADD, *Journal of the Royal Asiatic Society*, 173, 1930.

Tabouis, G. R. Nabuchodonosor et le triomphe de Babylone. 432 p. 19 croq., 18 ill. Paris, PAYOT, 1930 (30 fr.). ISIS

Grâce aux fouilles de M. KOLDEWEY, à la traduction des 27 inscriptions de NABUCHODONOSOR ainsi qu'à celle des innombrables tablettes cunéiformes

néo-babyloniennes, Mme G. R. TABOUIS a retracé l'épopée qui assura pour 75 années la suprématie de l'Empire Babylonien sur le monde antique, et a étudié la lutte qui se déroula plus de 6 siècles avant la venue du Christ entre trois civilisations : la civilisation égyptienne, la civilisation sémitique et la civilisation chaldéenne. L'auteur avait déjà touché à ces questions dans un livre consacré à TOUT-ANK-AMON (*Isis*, 13, 486). L. S.

Van Buren, Mrs. E. Douglas. Clay figurines of Babylonia and Assyria. LXIX + 287 p., 68 pl. New Haven, Yale University Press, 1930. ISIS

4. — GREECE

Antoniadi, E. M. La météorologie en Grèce antique. *L'Astronomie*, 45, 373-83, 1931. ISIS

« Au cours du nos recherches sur l'histoire de l'astronomie à la Bibliothèque Nationale de Paris, nous avons eu souvent l'occasion de nous rendre compte incidemment des observations, des idées et des découvertes des anciens en météorologie. Comme ces questions ne sont traitées que d'une manière très incomplète, et parfois même point du tout, dans les ouvrages spéciaux sur les phénomènes de l'atmosphère, il nous a paru intéressant d'exposer brièvement quelques-uns des résultats y relatifs obtenus en général plus de deux mille ans avant notre époque, et de donner la parole, autant que possible, aux philosophes de l'antiquité. »

Becker, Oskar. Die diairetische Erzeugung der platonischen Idealzahlen. *Quellen und Studien zur Gesch. d. Math., Astronomie und Physik*, Abt. B : Studien, 1, 464-501, 8 fig., 1931. ISIS

Bonner, Robert Johnson ; Smith, Gertrude. The administration of justice from HOMER to ARISTOTLE. Vol. 1, IX + 390 p. Chicago, University Press, 1930. ISIS

Cawadias, A. P. From Epidauros to GALENOS. The principal currents of Greek medical thought. *Annals of Medical History*, 3, 501-14, 4 fig., 1931. ISIS

Deonna, Waldemar. Dédale ou la statue de la Grèce archaïque, I : Origine et évolution de la statue archaïque. Problèmes techniques et esthétiques. 576 p. (*Ecole française d'Athènes. Travaux et Mémoires* publ. par les prof. de l'Inst. supér. d'études franç. et les membres étrangers de l'école. Fasc. II.) Paris, DE BOCCARD, 1930. ISIS

Reviewed by VALENTIN MÜLLER, *DLZ*, 1, 2031-33, 1930.

Dingler, Hugo. Über die Anfänge des exakten Systemgedankens bei den Griechen. *Archeion*, 13, 1-10, 1931. ISIS

La découverte capitale du génie grec est sans doute la méthode systématique de raisonnement où se manifeste la même tendance de clarté et d'ordre qu'on retrouve en art et en architecture. Les Eléates sont les premiers à affirmer la foi dans le raisonnement. Le travail mathématique le plus ancien que nous connaissons et dans lequel nous trouvons un véritable enchaînement du raisonnement est celui d'HIPPOCRATE DE CHIOS sur la quadrature des lunules. L. G.

Gardiner, Edward Norman. Athletics of the ancient world. x + 246 p. Oxford, University Press, 1930. ISIS

Ideler, Julius Ludovicus. Physici et medici graeci minores. Congessit ad fidem Codd. Mss., praesertim eorum, quos beatus DIETZIUS contulerat, veterumque editionum partim emendavit partim nunc prima vice edidit commentariis criticis indicibusque tam rerum quam verborum instruxit JULIUS LUDOVICUS IDELER. Vol. II. VIII + 464 p. Berlin, REIMER, 1842. ISIS

Reviewed by J. G. THIERFELDER, *Henschel's Janus*, 1, 858-60, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Marotte, F. La mesure de la terre dans l'antiquité. ERATOSTHÈNE et HIPPARQUE. *L'enseignement scientifique*, 4, 269-75, 1931. ISIS

Richter, Gisela Marie Augusta. Animals in Greek sculpture : a survey. XII + 87 p., 66 pl., 11 drawings. Oxford, University Press, 1930. ISIS

Tarn, William Wordthorpe. Hellenistic military and naval developments. VII + 170 p. Cambridge, University Press, 1930. ISIS

Vogel, K. Eine neue Quelle ältester griechischer Algebra. *Zeitschr. f. mathem. u. naturw. Unterr.*, 62, 266-71, 1931. ISIS

Weber, Carol. Frider. Dissertatio de latine scriptis quae Graeci veteres in linguam suam transtulerunt. Cassel, 1852. ISIS

Reviewed in *Second Janus*, 2, 656-59, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Welcker, F. G. Zu den Alterthümern der Heilkunde bei den Griechen. Besonders abgedruckt aus dem dritten Bande von F. G. WELCKERS kleinen Schriften. VI + 236 p., pl. Bonn, WEBER, 1850. ISIS

Reviewed by J. G. THIERFELDER, *Second Janus*, 2, 154-61, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

5. — ROME

Ducati, Pericle ; Giglioli, Giulio Q. Arte Etrusca. Rome, Società Editrice d'Arte Illustrata, 1927. ISIS

Kissel, Dr. Die symbolische Medicin der Römer nach den Quellen bearbeitet. *Henschel's Janus*, 3, 385-418, 577-674, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Rostovtzeff, Mikhail. Gesellschaft und Wirtschaft im römischen Kaiserreich. 2 vols. 788 p., 217 fig., 64 pl. Leipzig, QUELLE & MEYER, 1929. ISIS

Sichel. Cinq cachets inédits de médecins-oculistes romains, publiés et expliqués. 22 p. Paris, MALTESTE, 1845. ISIS

Reviewed by SEIDENSCHNUR, *Henschel's Janus*, 1, 422-24, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Toutain, J. Sur un rite curieux et significatif du culte de Vulcain à Rome. *Revue de l'histoire des religions*, 103, 136-43, 1931. ISIS

II. MIDDLE AGES

6. — MIDDLE AGES (*generalities*)

Aubert, Marcel. La sculpture française au début de l'époque gothique (1140-1225). XIV + 126 p., 88 pl. Paris, Pégase, 1929. ISIS

Reviewed by PAUL DESCHAMPS, *Journal des Savants*, 257-60, 1931.

Balzac, J. B. M. Baudry de. Voranzeige eines medizinisch-historischen Werks unter dem Titel : Dokumente zur Geschichte der Medizin im Mittelalter oder das Buch der Schule von Salerno, von ihren Ursprüngen, Schicksalen und Einflüssen mit einer vorausgeschickten Abhandlung über die allgemeine Geschichte der Medizin bis zur Wiederherstellung der griechischen, einem Gemälde der Medizin in der Mitte des 16ten Jahrhunderts (1553) mit noch nicht oder in alter Zeit bekannt gemachten, die Medizin des Mittelalters betreffenden Denkmälern und zahlreichen Bemerkungen aus der Vergleichung einer grossen Anzahl von Handschriften der königlichen Bibliothek zu Paris, derer zu London, Breslau, Berlin, Dresden und Brüssel. *Henschel's Janus*, 2, 353-63, 1847 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Deschamps, Paul. La sculpture française à l'époque romane, XI^e^-

XII^e siècles. XIII + 153 p., 96 pl. Paris, Pégase, 1930. ISIS

Reviewed by MARCEL AUBERT, *Journal des Savants*, 333-34, 1931.

Finke, Heinrich. Gesammelte Aufsätze zur Kulturgeschichte Spaniens. Bd. 2. In Verbindung mit K. BEYERLE u. G. SCHREIBER hrsg. v. HEINRICH FINKE. VIII + 402 p., fig., pl. (*Span. Forschgn. d. Görresgesellsch.* Hrsg. v. ihrem span. Kuratorium K. BEYERLE, H. FINKE, G. SCHREIBER. I. Reihe, Bd. 2 ;) Münster i.W., ASCHENDORFF, 1930. ISIS

Reviewed by RICHARD KONETZKE, *DLZ*, 2, 1618-22, 1931.

Haeser, H. Beitrag zur Geschichte der Schule von Salerno. *Second Janus*, 2, 175-76, 1852 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Haeser, H. Ueber die medicinische Lehranstalt zu Salerno und ihr Verhältniss zu den Mönchsschulen des Mittelalters. *Second Janus*, 1, 88-104, 1851 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Haeser, H. Die Weiber von Salerno. *Henschel's Janus*, 3, 368-69, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Henschel, A. W. E. Th. Biographisch-litterärische Notizen, berühmte Wundärzte und Aerzte des XIII. und XIV. Jahrhunderts betreffend. *Henschel's Janus*, 2, 132-51, 371-79, 526-46, 1847 ; 2, 375-425, 1852 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Heusinger, C. F. Ein Beitrag zur ältesten Geschichte der Krankenhäuser im Occidente. *Henschel's Janus*, 1, 771-74, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Lohmeyer, Hermann. VERGIL im deutschen Geistesleben bis auf NOTKER III. 200 p. (*German. Studien.* Unt. Mitwirkg. v. ander. hrsg. v. EMIL EBERING. H. 96.) Berlin, EBERING, 1930. ISIS

Reviewed by K. STRECKER, *DLZ*, 2, 1546-48, 1931.

Paetow, Louis John. A guide to the study of medieval history. Revised edition. XVII + 643 p. London, KEGAN PAUL, 1931. ISIS

Sudhoff, Karl. Glorie della medicina italiana nel medioevo. *Riv. di storia d. sc. med. e natur.*, 22, 1-7, 1931. ISIS

Tyler, J. E. The Alpine passes in the Middle Ages (962-1250). 188 p. Oxford, BLACKWELL, 1930. ISIS

Reviewed by D. W. FRESHFIELD, *Geographical Journal*, 77, 369-71, 1931.

7. BYZANTIUM

Heusinger, C. F. Die Parabalanen oder Parapemponten der alten Xenodochien. Nach einer alten Gelegenheitsschrift. *Henschel's Janus*, 2, 500-525, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Sichel, Dr. Poème grec inédit attribué au médecin AGLAJAS, publié d'après un manuscrit de la bibliothèque royale de Paris, par le Docteur SICHEL. 23 p. Paris, 1846.

Reviewed by M. LANDSBERG, *Henschel's Janus*, 1, 862-867; reprinted, ALFRED LORENTZ, Leipzig, 1931.

III. ORIENTAL SCIENCE AND CIVILIZATION

8. — ASIA (*generalities*)

Farmer, Henry George. Studies in oriental musical instruments. 101 p., 4 pl., ills. (First series). London, REEVES, 1931. ISIS

Western Asia

Farmer, Henry George. The organ of the ancients from Eastern sources (Hebrew, Syriac and Arabic). With a foreword by F. W. GALPIN. London, REEVES, 1931. ISIS

Sprengling, Martin. The alphabet : its rise and development from the Sinai inscriptions. XII + 72 p. (*Oriental Institute Communications*, no. 12.) Chicago, University Press, 1931. ISIS

Thomsen, Peter. Palästina und seine Kultur in fünf Jahrtausenden. 3rd ed., revised. 120 p., 8 fig., 16 pl. Leipzig, HINRICHS, 1931. ISIS

Reviewed by A. VINCENT, *Journal des Savants*, 331-33, 1931.

Warner, W. H. Lee. Notes on the Hadhramaut. *Geographical Journal*, 77, 217-22, 1931. ISIS

The myrrh and frankincense trade with Egypt and Palestine. C. W. A.

9. — INDIA

Das, Sukumar Ranjan. A short chronology of Indian astronomy. *Indian Historical Quarterly*, 7, 137-49, 1931. ISIS

Datta, Bibhutibhusan. Early history of the principle of place value. *Scientia*, 50, 1-12, 1931 ; trad. fr., *ibid.*, suppl., 1-11. ISIS

« On peut affirmer qu'avant toutes les autres nations, ce sont les Hindous

qui ont adopté l'usage général et systématique du principe de la valeur de localisation dans tous les cas où il s'agissait de formuler des nombres, pour le calcul aussi bien que pour les inscriptions. »

Datta, Bibhutibhusan. On the origin of the Hindu terms for " root." *American Mathematical Monthly*, 38, 371-76, 1931. ISIS

Devi, Aksaya Kumari. Essentials of Hindu philosophy. 48 p. Calcutta, KRISHNA Bros. ISIS

Devi, Aksaya Kumari. Female seers of ancient India. 44 p. Calcutta, KRISHNA Bros. ISIS

Devi, Aksaya Kumari. The fundamental of Hindu sociology. 66 p., portr. Calcutta, KRISHNA Bros. ISIS

Devi, Aksaya Kumari. Pilgrim's India. Vol. 1. 156 p. Calcutta, KRISHNA Bros., 1930. ISIS

Devi, Aksaya Kumari. Quintessence of the Upanishads. 32 p., portr. Calcutta, Krishna Bros. ISIS

Devi, Aksaya Kumari. The Vedic age. 80 p., portr. Calcutta, KRISHNA Bros., 1931. ISIS

Heusinger, C. F. Das Alter der Hospitäler in Cashmir. *Henschel's Janus*, 2, 393-94, 1847 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Heusinger, C. F. Der heutige Zustand der Medicin unter den eingeborenen Ceylons. Nach J. W. BENNETT, Ceylon and its capabilities, 1843. *Henschel's Janus*, 2, 807-12, 1847 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Nath, Pran. A study in the economic condition of ancient India. VIII + 172 p. (*Asiatic Society Monographs*, vol. 20). London, Royal Asiatic Society, 1929. ISIS

Reviewed by H. LOSCH, *DLZ*, 2, 1671-74, 1931.

Stenzler, A. F. Zur Geschichte der Indischen Medicin. *Henschel's Janus*, 1, 441-54, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Vullers, J. H. Alt-Indische Geburtshülfe. *Henschel's Janus*, 1, 225-56, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Webb, Allan. The historical relations of ancient Hindu with Greek medicine. 34 p. Calcutta, 1850. ISIS

Reviewed by A. W. E. TH. HENSCHEL, *Second Janus*, 2, 493-94, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Willcocks, Sir William. Lectures on the ancient system of irrigation in Bengal, and its application to modern problems. 128 p. Calcutta, University Press, 1930. ISIS

Reviewed by C. E. A. W. ODLING, *Geographical Journal*, 77, 374-75, 1931. " His theme appears to be that measures should be taken to reintroduce a system of overflow irrigation, which he claims to have been evolved by the rulers of the country some 3000 years ago. His chief definite authority quoted in support of this view is a statement of BERNIER. We know of no reliable record that corroborates this obiter dictum of BERNIER."

Wise, T. A. Commentary on the Hindu system of medicine. Calcutta, 1845. ISIS

Reviewed by C. F. HEUSINGER, *Henschel's Janus*, 3, 185-91, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931.

10. — CHINA

Gillis, I. V. The characters *ch'ao* and *hsi*. The Gest Chinese Research Library, McGill University, Montreal. VIII + 46 p. Peiping, The Standard Press, 1931. ISIS

From the foreword by JOHN C. FERGUSON : " In the year 100 A.D., HSŪ SHÊN published the Shuo Wên, which is both a dictionary and an etymologicon. The edition of this work now used is that of HSŪ HSŪAN, who brought out his revised version in the Tenth Century. It contains 9431 original characters and 1279 additional ones. Under each character it first explains the meaning, then the form, and lastly the pronunciation. In each of these three uses it is still recognized as a standard authority among all scholars. In consequence of later discoveries of divination bones, ritual bronzes, and stone inscriptions, some characters have been found which were unknown to the author and redactor of the Shuo Wên." " These two characters, *ch'ao* and *hsi*, must be classed as phonograms *(hsing shêng)* in the six-fold division of the origin of the written language. In the introduction to the Shuo Wên it is said that the Pao Shih when teaching the youthful Peers divided all characters into six classes *(liu shu)*, 1. indicators *(chih shih)*, 2. pictograms *(hsiang hsing)*, 3. phonograms *(hsing shêng)*, 4. combiners *(hui i)*, 5. divergers *(chuan chu)*, and 6. derivatives *(chia chieh)*. A phonogram in the Chinese sense of the word is a character representing something which has a form but cannot be pictured and an action that cannot be indicated. The two typical characters chosen to illustrate the meaning of a phonogram are *chiang* meaning river and *ho* meaning a stream. If pictured they would be the same; if represented in action they would also be similar. Thus neither indicators nor pictograms could be used. The radical for water was chosen for both characters with *kung* and *k'o* added respectively to differentiate the

sound. In other words, the final form of these characters was chosen on account of sound and they are thus classed as phonograms. *Ch'ao* and *hsi* might also be selected as typical phonograms. Both have the water radical. *Ch'ao* has the character for morning as its phonetic and *hsi* that for evening. Neither of these characters is found in the Shuo Wên, and this has left Commander GILLIS a free field for his work of investigation as to their occurrence and meaning."

Hee, Louis van. LÉOPOLD DE SAUSSURE et l'astronomie chinoise. *Archeion*, 13, 45-48, 1931. ISIS

Indications critiques sur quelques-uns des problèmes étudiés par L. DE SAUSSURE. « La précision qu'il (L. DE SAUSSURE) attribue à l'astronomie chinoise, XIV siècles avant notre ère n'est pas prouvée. » « Sur l'originalité de la science chinoise, on a le droit de rester dans l'expectative. Que la science astronomique chinoise soit antique, passe ! Qu'elle soit indépendante de l'Asie centrale et occidentale, il n'est plus permis de le nier. » « Que l'astronomie chinoise ait un caractère équatorial et non écliptique est un fait certain, connu depuis longtemps. La mérite de L. DE SAUSSURE est d'y avoir insisté, d'avoir apporté de nouveaux détails ».

Heusinger, C. F. Die chinesische Medicin. Nach J. WILSON, Medical notes on China, London, 1846. *Henschel's Janus*, 3, 193-216, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

12. — ISRAEL

Cohn, S. De Medicina Talmudica. Dissertatio inaug. medico-historica. Vratislaviae, 1846. ISIS

Reviewed by J. PINOFF, *Henschel's Janus*, 1, 433-34, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Israëls, A. H. Beiträge zur Talmudischen Medizin. *Henschel's Janus*, 2, 330-52, 1847 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Israëls, A. H. Tentamen historico-medicum, exhibens collectanea gynaecologica, quae ex Talmude Babylonico deprompsit A. H. ISRAËLS. Gröningae apud P. VAN ZWEEDEN. Leerae apud PRÄTORIUS und SEYDE, 1845. ISIS

Reviewed by J. PINOFF, *Henschel's Janus*, 1, 424-33, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Lods, Adolphe. Israël. Des origines au milieu du VIII^e^ siècle. XVI + 595 p., 3 maps, 38 fig., 12 pl. (Bibliothèque de synthèse historique. *L'évolution de l'humanité*.) Paris, La Renaissance du Livre, 1930. ISIS

Reviewed by A. VINCENT, *Journal des Savants*, 312-25, 1931.

14. — ISLAM

Bessel-Hagen, E. ; Spies, O. Das Buch über die Ausmessung der Kreisringe des AḤMAD IBN 'OMAR AL-KARĀBĪSĪ. Hrsg., übersetzt und erläutert von E. BESSEL-HAGEN und O. SPIES. *Quellen und Studien zur Gesch. d. Math., Astronomie und Physik*, Abt. B : Studien, 1, 502-40, 17 fig., 1931. ISIS

Chavrebière, Coissac de. Histoire du Maroc. Paris, PAYOT, 1931. ISIS

Gautier, Emile Félix. Mœurs et coutumes des Musulmans. 307 p., map, ills. (*Collection d'études, de documents et de témoignages pour servir à l'histoire de notre temps.*) Paris, PAYOT, 1931. ISIS

Henschel, A. W. E. Th. JOSEPH VON SONTHEIMER (1788-1847). Obituary in *Henschel's Janus*, 2, 193-95, 1847 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Heusinger, C. F. Ein Beitrag zur Geschichte der Lykanthropie nach Scheik MOHAMMED EL TOUNSY. *Henschel's Janus*, 2, 364-70, 1847 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Apropos of MUḤAMMAD IBN 'UMAR AL-TŪNISĪ (1789-1857) whose work was translated into French by Dr. PERRON : Voyage au Darfour (Paris, 1845). See also C. F. HEUSINGER's note in *Henschel's Janus*, 3, 361, 1848. G. S.

Heusinger, C. F. HITZIG über das Alter der Pocken in Arabien. Eine Bemerkung. *Henschel's Janus*, 1, 775-78, 1846 ; 2, 422-23, 1847 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Islamica. Editores AUGUST FISCHER et ERICH BRÄUNLICH. Vol. III : Supplementum. Vol. IV. 108 + 524 p. Leipzig, Asia Major, 1931. ISIS

Reviewed by R. HARTMANN, *DLZ*, 2, 1689-92, 1931.

Musil, Alois. In the Arabian desert. Arranged for publication by KATHARINE MCGIFFERT WRIGHT. XIV + 339 p. London, CAPE, 1930. ISIS

Spengler, L. Eintheilung und Bibliographie der orientalischen Medicin. *Henschel's Janus*, 3, 369-71, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Apropos of ḤĀJĪ KHALĪFA's bibliographic dictionary. G. S.

PART III

SYSTEMATIC CLASSIFICATION

Including only the material which could not be included in Parts I and II. Hence studies on Japanese astronomy or on XIIIth century astronomy are not classified below under astronomy, but above, respectively under Japan (in Part II) and S. XIII (in Part I).

The sections forming Part III are classified as follows :

I. *Science in general :* 15. Bibliography; 16. History; 17. Organization; 18. Philosophy.

II. *Formal sciences* (Knowledge of forms) : 19. Logic and Theory of Knowledge; 20. Mathematics; 21. Statistical methods.

III. *Physical sciences* (Knowledge of inorganic nature) : 22. Mechanics; 23. Astronomy; 24. Physics; 25. Chemistry (physico-chemistry, industrial chemistry); 26. Technology.

IV. *Biological sciences* (Knowledge of organic nature) : 27. Biology (generalities, " natural history ") ; 28. Botany (agronomy, phyto-pathology, palaeobotany); 29. Zoology.

V. *Sciences of the earth* (Implying knowledge of both organic and inorganic nature) : 30. Geodesy; 31. Geography and Oceanography; 32. Geology, Mineralogy, Palaeontology, Mining; 33. Meteorology, Climatology and Terrestrial Physics.

VI. *Anthropological and historical sciences* (Knowledge of man, past and present) : 34. Anatomy; 35. Physical anthropology (anthropometry and races of man); 36. Physiology (human and comparative); 37. Psychology (human and comparative); 38. Archaeology (generalities, methods); 39. Prehistory; 40. Ethnology (primitive and popular science); 41. Superstition and Occultism.

42. Economics (economic doctrines and history ; commerce ; transportation and communications); 43. Sociology, Jurisprudence and Positive polity; 44. History of Civilization (general history, historical methods, biography and chronology); 45. History of Art (art and science; iconography; arts and crafts); 46. History of Language, Writing and Literature; 47. History of Morals (moral organization of society); 48. History of Philosophy; 49. History of Religion (science and religion).

VII. *Medicine :* 50. History, organization and philosophy of medicine; 51. Epidemiology, History of special diseases. Public health and Social medicine; 52. History of hospitals and of medical teaching; 53. Pharmacy, Pharmacology, Toxicology.

VIII. *Education* (The methods of accumulating, imparting and diffusing knowledge); 54. Education (generalities, methods, colleges, universities); 55. Academies, Societies, Congresses. National and international organization of science; 56. Bibliography (methods, libraries); 57. Museology (museums and collections).

IX. 58. Alia; 59. Errata.

The applied sciences are not disconnected from the pure sciences, but, as far as possible, the principles and applications of science are considered in the same section. However, applications based upon the principles of many sciences are dealt with separately (e.g. technology; medicine; education).

I. SCIENCE IN GENERAL

16. — HISTORY OF SCIENCE

Bridges, Thomas Charles ; Tiltman, H. Hessell. Master minds of modern science. 278 p., 32 pl. London, HARRAP, 1930. ISIS

Cushing, Harvey. One hundred and fifty years : from tallow-dip to television. *New Eng. J. Med.*, 204, 1235-44, 1931. ISIS

Annual discourse before the Massachusetts Medical Society at the 150th reunion held in Boston, June 8, 1931. One of CUSHING's most delightfully written historical essays. Skillful use of the idea that a genius ripens the time for his own great work. C. D. L.

Harvey-Gibson, Robert John (1860-1929). Two thousand years of science : the wonders of nature and their discoverers. VIII + 362 p. Second ed., revised and enlarged by A. W. TITHERLEY, 1931. London, BLACK, 1929. ISIS

Reviewed by E. J. H., *Nature*, 125, 404-05, 1930.

Lhéritier, Michel. L'enseignement de l'histoire des sciences. Projet d'enquête. *Archeion*, 13, 159-67, 1931. ISIS

Considération sur l'enseignement de l'histoire des sciences aux différents degrés de l'enseignement. MICHEL LHÉRITIER, secrétaire général du comité international des sciences historiques les donne comme préface à la discussion qui a dû s'ouvrir sur ce sujet au congrès de Londres et qui pourrait être reprise au congrès de Varsovie (21-28.08.1933). L. G.

International Congress of the History of Science and Technology, Second. 18 p., fig. London, Science Museum, June 29th to July 4th, 1931. ISIS

(International Congress of the history of Science and technology, Second). The first century of science in England. GIORDANO BRUNO to ISAAC NEWTON, 1584-1687. Notes descriptive of an exhibit at the British Museum. 28 p. London, 1931. ISIS

Metzger, Hélène. La philosophie de LUCIEN LÉVY-BRUHL et l'histoire des sciences. *Archeion*, 12, 15-24, 1930. ISIS

Price, George McCready. A history of some scientific blunders. 138 p. London, OLIPHANTS, 1930. ISIS

18. — PHILOSOPHY OF SCIENCE

Dingler, Hugo. La notion de système dans l'histoire et la philosophie des sciences. *Archeion*, 13, 210-25, 1931. ISIS

Conférence faite le 15.04.1931 à une séance de la section d'histoire des sciences du centre international de synthèse.

Dotterer, Ray Harbaugh. Philosophy by way of the sciences : an introductory textbook. XV + 469 p. New York, MACMILLAN, 1929. ISIS

Reviewed in *Nature*, 125, 521-22, 1930.

Perrin, Jean ; Langevin, Paul; Urbain, Georges; Lapicque, Louis ; Pérèz, Charles ; Plantefol, L. L'orientation actuelle des sciences. Introduction de LÉON BRUNSCHVICG. 158 p. (*Bibl. de phil. contempor.*) Paris, ALCAN, 1930 (30 fr.). ISIS

Conférences faites en 1929-1930 à l'École normale supérieure par quelques-uns des maîtres français des sciences physico-chimiques ou biologiques. JEAN PERRIN a entretenu ses auditeurs de la chimie physique; PAUL LANGEVIN leur a exposé l'orientation actuelle de la physique; GEORGES URBAIN a traité des doctrines chimiques; LOUIS LAPICQUE, de la physiologie (question de l'influx nerveux); CHARLES PÉRÈZ, de quelques points de biologie générale (embryologie, génétique); et L. PLANTEFOL, de la biologie végétale. L. G.

Planck, Max. Positivismus und reale Aussenwelt : Vortrag, gehalten am 12. November 1930 im Harnack-Haus der Kaiser Wilhelm-Gesellschaft für Förderung der Wissenschaften. III + 35 p. Leipzig, Akademische Verlagsgesellschaft, 1931. ISIS

Smuts, J. C. The scientific world-picture of to-day. Presidential address delivered in London on Sept. 23, 1931, at the centenary meeting of the British Association. *Nature*, 128, 521-29, 1931.

II. FORMAL SCIENCES (Knowledge of forms)

19. — LOGIC AND THEORY OF KNOWLEDGE

Carnap, Rudolf. Abriss der Logistik. Mit besonderer Berücksichtigung der Relationstheorie und ihrer Anwendungen. VI + 114 p. (*Schriften z. wissenschaftl. Weltauffassung*. Hrsg. v. PHIL. FRANK u. MOR. SCHLICK, Bd. 2.) Wien, SPRINGER, 1929. ISIS

Reviewed by ADOLF FRAENKEL, *DLZ*, 1, 89-90, 1930.

Hilbert, David ; Ackermann, W. Grundzüge der theoretischen Logik. VIII + 120 p. (*Die Grundlehren d. mathem. Wissensch. d.*

Anwendungsgeb. hrsg. v. R. COURANT gemeinsam m. W. BLASCHKE, M. BORN u. C. RUNGE. Bd. 27.) Berlin, SPRINGER, 1928. ISIS

Reviewed by HEINRICH SCHOLZ, *DLZ*, 1, 137-42, 1930.

Le Roy, Edouard. La pensée intuitive. I. Au delà du discours. VIII + 206 p. ; II. Invention et vérification. 298 p. Paris, BOIVIN, 1929-1930. ISIS

« Le problème de l'intuition est aujourd'hui au premier plan de l'actualité parmi les philosophes ». Qu'est-ce que l'intuition ? En quoi consiste et comment doit être conduite la pensée intuitive ? Que vaut cette démarche de l'esprit et de quels résultats est-elle capable ? Telles sont les questions auxquelles l'auteur s'est proposé de répondre.

Tout d'abord, ED. LE ROY s'attache à définir l'instrument de la pensée intuitive. Images et concepts explicites ne suffisant plus, il introduit un élément nouveau, *le schéma dynamique*, dont il définit la nature, prouve l'existence et analyse le fonctionnement. Ce premier point établi, il étudie la marche essentielle de la pensée intuitive : *le retour à l'immédiat*, puis *l'acte d'intuition*. Ces principes étant posés dans le premier volume, l'auteur en développe ensuite les « conséquences d'ordre historique et pratique, en des analyses complémentaires portant sur les démarches d'*invention*, puis de *vérification*, enfin sur les valeurs de la pensée intuitive et les moyens de s'élever par elle à un savoir absolu ». L. G.

20. — MATHEMATICS

Dantzig, Tobias. Number : the language of science ; a critical survey written for the cultured non-mathematician. XI + 260 p., 11 pl. London, ALLEN and UNWIN, 1930. ISIS

Güntert, Hermann. Weiteres zum Begriff " Winkel " im ursprünglichen Denken. *Wörter u. Sachen*, 124-42, 9 fig., 1928. ISIS

Hilbert, David. Grundlagen der Geometrie. 7. umgearb. u. verm. Aufl. VII + 326 p., 100 fig. (*Wissensch. u. Hypothese.* Bd. VII.) Leipzig, TEUBNER, 1930. ISIS

Reviewed by KURT REIDEMEISTER, *DLZ*, 2, 90-92, 1931.

Hölder, Otto. Die Arithmetik in strenger Begründung. 2. Aufl. IV + 73 p. Berlin, SPRINGER, 1929. ISIS

Reviewed by JOHANN V. NEUMANN, *DLZ*, 1, 285-86, 1930.

Hofmann, Jos. E. Erklärungsversuche für ARCHIMEDS Berechnung von $\sqrt{3}$. *Archiv für Geschichte der Mathematik, der Naturwissenschaften und der Technik*, 12, 387-408, 6 fig., 1930. ISIS

Meringer, Rudolf. Spitze, Winkel, Knie im ursprünglichen Denken. *Wörter u. Sachen*, 11, 114-23, 7 fig., 1928. ISIS

Neugebauer, Otto. Zur vorgriechischen Mathematik. *Erkenntnis*, 2, 122-34, 1931. ISIS

Nicod, Jean. Foundations of geometry and induction. Containing geometry in the sensible world, and the logical problem of induction. Prefaces by BERTRAND RUSSELL and ANDRÉ LALANDE. Translated by PHILIP PAUL WIENER. IV + 286 p. (*International Library of Psychology, Philosophy and Scientific Method.*) London, KEGAN PAUL, 1930. ISIS

Reviewed by T. G., *Nature*, 128, 430, 1931.

Thompson, James Edgar. A manual of the slide rule : its history, principle and operation. Second printing. VII + 220 p. London, CHAPMAN and HALL, 1931. ISIS

Reviewed in *Nature*, 128, 563, 1931.

Vogel, K. Neue Quellen und Forschungen zur Geschichte der vorgriechischen Mathematik. *Zeitschr. f. mathem. u. naturw. Unterr.*, 62, 289-95, 1931. ISIS

III. PHYSICAL SCIENCES

(Knowledge of inorganic nature)

22. — MECHANICS

(*Including celestial and atomical mechanics*)

Brüll, Erhard. Erkenntniskritische Grundprobleme der Relativitätstheory, Quanten- und Wellenmechanik. 66 p. Breslau, BORGMEYER, 1929. ISIS

Chapuis, Alfred ; Gélis, Edouard. Le monde des automates. Etude historique et technique. Vol. 1, 348 p. ; vol. 2, 352 p. Neuchatel, CHAPUIS, 1928. ISIS

Reviewed by GIULIO PANCONCELLI-CALZIA, *DLZ*, 1, 1628-29, 1930.

Driesch, Hans. Relativitätstheorie und Weltanschauung. Zweite umgearbeitete Auflage. VIII + 106 p. Leipzig, QUELLE und MEYER, 1930. ISIS

23. — ASTRONOMY

Bailey, Solon I. The history and work of Harvard Observatory, 1839 to 1927 : an outline of the origin, development and researches of the Astronomical Observatory of Harvard College together with brief biographies of its leading membres. XIII + 301 p., 23 pl. (Harvard Observatory Monographs, no. 4.) New York, McGRAW-HILL, 1931. ISIS

Choisnard, Paul. Les précurseurs de l'astrologie scientifique et la tradition (PTOLÉMÉE, Saint THOMAS D'AQUIN et KÉPLER.) 74 p. Paris, LEROUX, 1929. ISIS

Eddington, Arthur Stanley. Etoiles et atomes. Trad. sur la 3*e* éd. anglaise avec compléments de l'auteur par J. ROSSIGNOL. IX + 188 p., 12 pl., Paris, HERMANN, 1930 (35 fr.) ISIS

EDDINGTON est un des savants qui ont le plus contribué à faire progresser notre connaissance de la structure de l'univers. On lui doit en particulier un livre sur la constitution interne des étoiles (*Isis*, 10, 262); la théorie mathématique y tient une large place. Dans les quatre conférences ici traduites (première édition anglaise, *Isis*, 11, 243), et mises à jour, l'auteur expose simplement les idées directrices et les résultats des recherches les plus récentes, des vues les plus audacieuses de la physique. L. G.

Humbert, Pierre. La première carte de la lune. *Revue des questions scientifiques*, 100, 193-204, 1931. ISIS

Jeans, Sir James. L'univers. Trad. de l'anglais par GEORGES CROS. 287 p., 24 fig., 24 pl. h. texte. Paris, PAYOT, 1930 (36 fr.). ISIS

Ouvrage non destiné aux astronomes ou aux physiciens de profession, mais à des lecteurs cultivés ayant en astronomie des connaissances générales, et désirant se rendre compte « en langage courant, des méthodes employées dans les recherches astronomiques, procédant aussi bien de l'observation que des calculs mathématiques, et des résultats qu'elles ont permis d'obtenir ». L'auteur insiste particulièrement sur les questions de cosmogonie et d'évolution et sur la structure générale de l'univers. — Introduction : l'étude de l'astronomie; 1. L'exploration du ciel; 2. L'exploration de l'atome; 3. L'exploration du temps; 4. Comment se sont formés les divers corps de l'univers; 5. Les étoiles; 6. Le commencement et la fin de l'univers. — Pour l'édition anglaise, *Isis*, 14, 545. L. G.

Levinson, Horace C.; Zeisler, Ernest Bloomfield. The law of gravitation in relativity. 2d ed. 128 p. The University of Chicago Press, 1931. ($ 3.50). ISIS

" This book deals with the central problem of EINSTEIN's relativity theory, that of law of gravitation. It deduces admissible laws of this nature from

the postulates of the theory in a mathematically rigourous manner." "As the method adopted is that of the theory of tensors, the first few chapters are devoted to a detailed treatment of this subject. The foundations of the theory have been freely modified with a view to the applications that follow; particular stress is laid on precise definition of terms and processes. It is shown that there are exactly four possible tensor laws of gravitation. Two of these are inadequate for clear reasons; the third cannot be eliminated on such simple grounds; the fourth is EINSTEIN's law. The last chapter contains a brief treatment of the more elementary dynamical problems of the solar system, under a very general set of gravitational laws that includes the above set as a special case."

Przybyllok, Erich. Unser Kalender in Vergangenheit und Zukunft. 94 p. (*Morgenland. Darstellungen aus Geschichte und Kultur des Ostens.* H. 22.) Leipzig, HINRICH, 1930. ISIS

Zinner, Ernst. Die Geschichte der Sternkunde von den ersten Anfängen bis zur Gegenwart. XI + 673 p., 54 illus., 13 pl. Berlin, SPRINGER, 1931. ISIS

Reviewed by P. KIRCHBERGER, *DLZ*, 2, 1815-20, 1931.

24. — PHYSICS

Andrade, Edward Neville da Costa. The mechanism of Nature; being a simple approach to modern views on the structure of matter and radiation. Third edition. London, BELL, 1930. ISIS

Appleyard, Rollo. Pioneers of electrical communication. IX + 347 p. London, MACMILLAN, 1930. ISIS

Reviewed by A. R., *Nature*, 125, 300, 1930.

Bjerknes, V. K. F. Dynamical aspects of electromagnetism. *Nature*, 128, 369-71, 1931. ISIS

Pacotte, Julien. La pensée technique. *Bibliothèque de philosophie contemporaine.* II + 156 p., Paris, ALCAN, 1931. (15 fr.). ISIS

J'ai précédemment rendu compte (*Isis*, 9, 177) d'un ouvrage de J. PACOTTE sur « la pensée mathématique contemporaine », où il s'intéressait particulièrement à la connaissance mathématique du monde extérieur. En 1929, il consacrait un livre aux « méthodes nouvelles en analyse quantique (mécanique quantique, mécanique ondulatoire) » (ALCAN). Le présent livre « envisage dans l'élaboration de la physique, la pensée technique. Il est consacré aux conditions premières de la technique et de l'expérimentation ». I. Les attaches géologiques de la physique; II. Les configurations matérielles et les substances chimiques en technique; III. La machine; IV. La technique dans l'enseignement de la statique; V. La transformation technique des phénomènes (Définition. Idée d'une science de la transformation); VI. La reproduction des

configurations matérielles et optiques; VII. La transmission des mouvements matériels et optiques; VIII. L'enregistrement continu et l'exploration; IX. La reproduction des configurations par la trace; X. La physique comme technique générale; XI. L'orientation actuelle de la physique mathématique et la conception technique de la physique. L. G.

Reichenbach, Hans. Atom und Kosmos. Das physikalische Weltbild der Gegenwart. 323 p., ill. Berlin, Deutsche Buch-Gemeinschaft, 1930. ISIS

C. R. de MAURICE LECAT in *Revue des questions scientifiques*, 467-80; mai 237-61, septembre, 1931.

Rolt, Frederick Henry. Gauges and fine measurements. Edited by Sir R. T. GLAZEBROOK. Introductory note by J. E. SEARS, jr. Vol. 1 : Standards of length, measuring machines, comparators. XV + 366 p. Vol. 2 : Limit gauges, measuring instruments, general methods of measurement. VIII + 357 p. London, MACMILLAN, 1929. ISIS

Reviewed by L. M. D., *Nature*, 125, 81-82, 1930.

Sevin, Emile. Gravitation, lumière et électromagnétisme. (Synthèse physique). Préface de MAURICE D'OCAGNE. XIII + 61 p. Paris, BLANCHARD, 1930. ISIS

25. — CHEMISTRY, PHYSICO-CHEMISTRY, INDUSTRIAL CHEMISTRY

Beale, Harriett Blaine. The beginnings of chemistry : a story book of science for young people. Illustrations by J. EDMUND WOODS. X + 243 p. New York, COWARD, MCCANN, 1929. ISIS

Grün, Richard. Der Zement. Herstellung, Eigenschaften und Verwendung. IX + 173 p., 90 fig., 35 tables. Berlin, SPRINGER, 1927. ISIS

Hackh, Ingo Waldemar Dagobert. A chemical dictionary : containing the words generally used in chemistry and many of the terms used in the related sciences of physics, astrophysics, mineralogy, pharmacy, and biology, with their pronunciations ; based on recent chemical literature. VIII + 790 p. London, CHURCHILL, 1930. ISIS

Reviewed by C. S. GIBSON, *Nature*, 125, 593-94, 1930.

Jones, Thomas William. Hermes : or the future of chemistry. 88 p. (*To-day and to-morrow* series.) London, KEGAN PAUL, 1928. ISIS

Kendall, James. At home among the atoms : a first book of congenial chemistry. XV + 270 p., 16 pl. London, BELL, 1929. ISIS

Reviewed by JOHN READ, *Nature*, 125, 155-57, 1930.

Lippmann, Edmund O. von. Zur Geschichte der angeblichen Entstehung von Wasser aus Luft. *Chemiker-Zeitung*, 55, 681, 1931. ISIS

Lorenz, Richard. Das Gesetz der chemischen Massenwirkung. Seine thermodynamische Begründung und Erweiterung. X + 176 p., 13 fig. Leipzig, VOSS, 1927. ISIS

Metzger, Hélène. NEWTON, STAHL, BOERHAAVE et la doctrine chimique. 332 p. Paris, ALCAN, 1930. ISIS

Reviewed by RUDOLF WINDERLICH, *Archiv für Geschichte der Mathematik, der Naturwissenschaften und der Technik*, 13, 219-21, 1930.

Münzer, Gustav. Das Platin. Gewinnung, Handel, Verwendung. 136 p. Leipzig, DIEBENER, 1929. ISIS

Singer, Dorothea Waley. Catalogue of Latin and vernacular alchemical manuscripts in Great Britain and Ireland dating from before the XVI century. Assisted by ANNIE ANDERSON and ROBINA ADDIS. Volume III. VI + 423 p. Brussels, Union Académique internationale (Palais des Académies), 1931. (15 belgas ; the three vols., 40 belgas). ISIS

Vols. 1 and 2 of this fundamental publication were reviewed in *Isis*, 12, 168-69; 15, 299. The hope we then expressed that it might soon be completed and provided with the indispensable indices is now fulfilled in the most satisfactory manner. This third volume contains an analysis of various KYRANNIDES MSS. (14 p.), then various references (some of them quite long) to alchemy and chemical practice in legal archives (21 p.), finally the very elaborate indices (309 p.) : initia and titles; names, places, and languages; MSS.; alchemical illustrations; abbreviated references. There is also a very long series of addenda and corrigenda (67 p.). Mrs. SINGER's Catalogue is an invaluable tool for the study of mediaeval chemistry in western Europe. Let us hope that the splendid example she has given us will be followed by scholars of other countries, and that she will soon be strong enough (she has been recently handicapped by a very serious illness) to work out in the same way other parts of her manuscript catalogue of English MSS., particularly the mathematical, astrological, and medical parts. G. S.

Timmermans, Jean. La notion d'espèce en chimie. III + 134 p. Paris, GAUTHIER-VILLARS, 1928. ISIS

Reviewed by T. M. LOWRY, *Nature*, 123, 308-10, 1929.

26. — TECHNOLOGY

(For mining, see 32 *Geology ; for industrial chemistry,* 25 *Chemistry. See also Arts and Crafts, under* 45*)*

Armstrong, Anthony. Taxi ! Being a not too serious book about London taxicabs and drivers, with a few remarks on their foreign cousins. 319 p. London, HODDER and STOUGHTON, 1930. ISIS

Beery, Pauline Gracia. Stuff : the story of materials in the service of man. XIII + 504 p., front., illus. New York, APPLETON, 1930. ISIS

Boulton, Sir Harold Edwin. A century of wood preserving. Edited by Sir HAROLD BOULTON. X + 150 p., 3 pl. London, ALLAN, 1930. ISIS

Reviewed in *Nature*, 127, 195-96, 1931.

Clark, H. O. Notes on French windmills. *The Newcomen Society, Transactions*, 9, 52-59, 4 pl., 1928-1929. ISIS

Deakin, W. H. Development of railway signalling. *The Newcomen Society, Transactions*, 9, 1-11, 3 fig., 3 pl., 1929-1930. ISIS

Dean, Bashford. Catalogue of European court swords and hunting swords. Including the ELLIS, DE DINO, RIGGS, and REUBELL collection. VI + 190 p., 85 pl. New York, *Metropolitan Museum of Art*, 1929. ISIS

√**Ferguson, John.** The secrets of ALEXIS : a sixteenth century collection of medical and technical receipts. *Proc. Roy. Soc. Med.*, 24, 225-46, 1930. ISIS

Posthumous publication of an important study of a book which " must be reckoned with in every history and bibliography of technology." " No treatise better illustrates the popular or household practice of applied chemistry of the arts, and of medicine, at its date, than that which passes under the name of ALEXIS or ALESSIO, OF PIEDMONT." Discussion of the mysterious ALEXIS (1471-1565 ?), and of an intriguing but nebulous Academy for experimental scientific research. Bibliography of the treatise. C. D. L.

Gliozzi, Mario. Breve historia de machinas thermico. *Schola et vita*, 6, 169-72, 1931. ISIS

Harper, Harry. The evolution of the flying machine. Balloon, airship, aeroplane. 288 p. London, HUTCHINSON, 1930. ISIS

Hössle, Friedrich von. Die Geschichte des Papiers, die Roh- und Halbstoffe der Papierfabrikation mit Ausnahme des Holzzellstoffes. Neuausgabe. VIII + 278 p. (*Technik u. Praxis d. Papierfabrikation*, Bd. 1, Tl. 1.) Berlin, ELSNER, 1929. ISIS

Hopkins, Robert Thurston. Old watermills and windmills. Introduction by ARTHUR BECKETT. VIII + 245 p. London, ALLAN, 1930. ISIS

La Roërie, Louis Guilleux ; Vivielle, Jean. Navires et marins, de la rame à l'hélice. 2 vols. Paris, DUCHARTRE & VAN BUGGENHOUDT, 1930. ISIS

Mercer, Henry Chapman. Ancient carpenters' tools. Illustrated and explained together with the implements of the lumberman, joiner and cabinet maker, in use in the eighteenth century. VII + 328 p., 248 fig. Doylestown, Burks County Historical Society, 1929. ISIS

Putti, Vittorio. Historic artificial limbs. XII + 64 p., 11 illus., New York, HOEBER, 1930. ISIS

Après avoir rappelé l'ancienneté des membres artificiels (textes d'HÉRODOTE, de PLINE LE JEUNE, documents iconographiques), l'auteur décrit sept pièces de musée datant du XV^e^ au XVII^e^ s. L. G.

Smith, John. Old Scottish clockmakers. From 1453 to 1850. Compiled from original sources with notes. Second edition, revised and enlarged. 452 p., 25 illus. Edinburgh, OLIVER and BOYD, 1930. ISIS

IV. BIOLOGICAL SCIENCES

(Knowledge of organic nature)

27. — BIOLOGY

(*Generalities*, "*Natural history*.")

Berthier, J. ; Lauvernier, C. Tableaux d'histoire générale. Présentation synchronique des principaux événements contemporains à travers les siècles. Politiques, religions, philosophies, lettres, arts, sciences, découvertes, inventions, institutions. Introduction de EMILE PICARD. X + 7 p., 43 tables. Paris, Société Mercasia, 1930. (Frs. 160.) ISIS

This tabular presentation of the events of history is distributed over 43 double-page folio tables and includes the period from the sixth century B.C. to 1900 A.D. There are about 2,300 entries, classified by subject in similar

sequences in the successive tables. The entries are both biographical and factual. The biographical entries give, as a rule, only the family name without initials or given name, except where several of the same family name are contiguous; the year of birth and death; and several of the leading publications, with the date of each, for scientific writers, and the discovery and its date in the case of discoverers, inventors, etc. The tables each represent a series of fields for an entire century so that contemporary events in all fields can be correlated with facility. Obviously the space allotted this enterprise is so limited that the omissions exceed manyfold the inclusions. This explains the omission of such names as HALLER, JOHANNES MÜLLER, and MENDEL. The typographical set-up is clear and well-planned and there is a complete index. C. A. K.

Cardan, Jerome. The book of my life (*De vita propria liber*). Translated from the Latin by JEAN STONER. XVI + 331 p., portr. New York, DUTTON, 1930 ($. 3.50). ISIS

Miss STONER of the Dalton School in New York has prepared the only English translation of CARDAN's " De vita propria liber " which he wrote in 1575 in the 75th year of his eventful but saddened career. Its value lies not so much in its historical content, which is rather less than that of his contemporary autobiographer, CELLINI the artist, as in the scientific quality of the self-revelations. In autobiography it was a departure from the historical treatises of CAESAR and JOSEPHUS and the religious homily of SAINT AUGUSTINE and his imitators. It is a genuine psychological analysis in its penetration, objectiveness, and scope. Historically it is the first scientific autobiography. CARDAN was a prolific writer, producing seven thousand folio pages in the fields of esoteric philosophy, mathematics, and medicine, largely in therapeutics. The " Vita " was first published in Paris in 1643 under the editorship of GABRIEL NAUDÉ who in his *indicium* pictured CARDAN as a moral monster, superstitious, and careless of the truth. A second edition appeared in Amsterdam in 1654 and in SPON's " Opera Omnia " in Lyons in 1663, the last edition in Latin. It was translated into Italian by MONTOVANI (1821) and into German by HEFELE (1914). Thirty-one pages of notes and a bibliography of 32 titles are included. The translation makes more available the life story of this scholar, humanist, and " man of discoveries." C. A. K.

Dewar, Douglas. Difficulties of the evolution theory. VIII + 192 p. 6 figs. London, EDWARD ARNOLD, 1931 (12 s. 6 d.). ISIS

This is an up-to-date summary of the difficulties which systematics, comparative anatomy, and especially palaeontology, have accumulated in the last seventy years in applying the Darwinian hypothesis to the evolution of animal life. It is also a defense of evolution by special creation. Even saltatory mutations are interpreted as indistinguishable from special creations. The data marshaled in review include the seeming limitations of the changes which have been effected by breeders, merely to the intraspecific, or intrageneric, limits. At least no new families have been thus produced. The changes induced by breeding soon come to a standstill. In rebuttal it may be said that while this may be true in experiments in selection, it is far from certain that the limits are always quickly reached in crossbreeding.

The argument for evolution based on Australian marsupials is attacked on the ground that the fossil placentals are older than the known fossil marsupials, that no fossil marsupial is known from Asia or Eastern Europe, though Miocene placentals have been found in Asia. The hypothetical lost continent of Antarctica does not help matters much, for fossils show that Patagonia was inhabited by placentals before marsupials reached it, hence if Antarctica did exist, placentals should have preceded marsupials into Australia. The independent evolution (creation)? of marsupials in two localities might solve this dilemma. The lack of intermediate fossils has been attributed to the imperfection of the geological record. The existing evidence on this point still shows that while most organisms in the past have undergone gradual modification within their respective groups, most of the gaps between the phyla of invertebrates still remain unfilled. New types often, if not invariably, have appeared abruptly and in some diversity. This summary of the difficulties which still exist is a serious and, in the main, a critical one, and serves a useful historical function in an assembly of the concrete difficulties in the application of the concept of organic evolution. C. A. K.

Haldane, J. S. The philosophical basis of biology : Donnellan lectures, University of Dublin, 1930. x + 169 p. London, HODDER and STOUGHTON, 1931. ISIS

Kostychev, S. KOSTYCHEV's chemical plant physiology. Authorized edition in English with editorial notes. Written and revised by S. KOSTYCHEV. Translated and edited by C. J. LYON. XVI + 497 p., 45 figs., portr. Philadelphia, BLAKISTON, 1931 ($ 6.00). ISIS

This subject has depended upon advances within the present century in physical chemistry and bio-chemistry, as will be shown by a comparison of W. PFEFFER's Pflanzenphysiologie (1897) with this book. Two important sections of this work, that on photosynthesis and the one on fermentations, contain historical reviews of their fields. In the first the classic experiments of PRIESTLEY on the " rectification " by plants of air " spoiled " by animals are related. The failure of SCHEELE to confirm PRIESTLEY's results and the latter's helplessness before these criticisms was explained by INGEN-HOUSZ (1779), the Dutch scientist who proved that only the green parts of plants improve the air, and that only in the light, for in darkness plants respire like animals. It remained for DE SAUSSURE (1804) to furnish the quantitative equation of photosynthesis, and for BOUSSINGAULT (1860-1878) to include the assimilation of nitrogen in exact studies of vegetable metabolism. INGEN-HOUSZ's work remained unappreciated for a century, partly because of PRIESTLEY's appropriation of part of it and his criticisms of it, and partly because the Italian scholar CAVALLO and the Swiss SENEBIER sided with PRIESTLEY, and the latter also appropriated the Dutch investigator's discovery as his own. TREUB (1880) and WIESNER (1905) have done much to set forth the claims of INGEN-HOUSZ to priority in the discovery of photosynthesis.

The LIEBIG-PASTEUR controversy over the nature of fermentation is related. Attention is called to the fact that LIEBIG's original paper (1839) maintained that living yeast cells effect no alcoholic fermentation. He ascribed this power to molecular vibrations caused by the diffusion of proteins from

dead yeast cells. PASTEUR's success in establishing fermentation as a biological process in opposition to LIEBIG and TRAUBE rests upon the perfection of his experimental technique in which not a single experimental error was made. Especially important was PASTEUR's dicsovery of the causal agent of butyric acid fermentation and that oxygen was a fatal poison to these organisms. It proved not only that life without oxygen is possible, but that in some cases life with access to oxygen is impossible. C. A. K.

Rignano, Eugenio. The concept of purpose in biology. *Quarterly Review of Psychology and Philosophy*, 40, 335-40, 1931. ISIS

Rockefeller Institute for Medical Research, The. History, organization, present scope of scientific work, buildings and equipment, publications. 36 p., 2 pl. New York, Rockefeller Institute for Medical Research, 1931. ISIS

This is an account of the Rockefeller Institute with its Medical Institute in New York and that of Comparative Pathology of Animals and Plants at Princeton, N. J. Lists of trustees, scientific directors, and staffs are given. There is also a history of its origin, endowment, development from 1901 to date, including the plans for the recently established Division of Plant Pathology. Its organization and present fields of investigation are outlined and its buildings and equipement briefly described. C. A. K.

Rostand, Jean, La formation de l'être. Histoire des idées sur la génération. 222 p., ill. Paris, HACHETTE, 1930. ISIS

Singer, Charles. A short history of biology. A general introduction to the study of living things. XXXV + 572 p., front., ills. Oxford, University Press, 1931. ISIS

Reviewed by F. M. G. DE FEYFER, *Bijdragen tot de geschiedenis der geneeskunde*, 11, 256-57, 1931.

Thomson, Sir J. Arthur ; Geddes, Patrick. Life : outlines of general biology. 2 vols. Vol. 1, XIX + 714 p. Vol. 2, XI + 801 p. London, WILLIAMS and NORGATE, 1931. ISIS

28. BOTANY

Heusinger, C. F. Die Pflanzenwelt, ihr Wechsel und ihr Erkranken, in Beziehung auf die Geschichte und die Verbreitung der Krankheiten der Menschheit. *Second Janus*, 1, 24-47, 1851; reprinted, ALFRED LORENTZ, Leipzig, 1931.

V. SCIENCES OF THE EARTH

(Implying knowledge of both organic and inorganic nature.)

31. — GEOGRAPHY AND OCEANOGRAPHY

Bigelow, Henry Bryant. Oceanography : its scope, problems, and economic importance. VI + 263 p. Boston, HOUGHTON, MIFFLIN, 1931. ISIS

Reviewed by H. A. MARMER, *Geographical Review*, 21, 703-04, 1931.

Curnow, I. J. The world mapped. 104 p. London, SIFTON, PRAED, 1930. ISIS

Reviewed by E. G. R. TAYLOR, *Geographical Journal*, 77, 485, 1931. " This little introduction to the history of the map gives just that information which the non-specialist needs."

Lennard, E. W. Some intimate Bristol connections with the Overseas Empire. *Geography*, 16, 109-21, 1931. ISIS

" The aim of this paper is to collate, under geographical headings, links, some well known and others more obscure, between the city and port of Bristol and Britain's past and present Overseas Empire."

Reparaz, Gonzalo de. La época de los grandes descubrimientos Españoles y Portugueses. 206 + XII p. Barcelona, Editorial Labor, 1931. ISIS

Reviewed by G. R. CRANE, *Geographical Journal*, 77, 369, 1931. " Traces clearly the course of Spanish and Portuguese exploration down to the sixteenth century."

Richter, Herman. Skånes Karta från mitten av 1500-talet till omkring 1700. Bidrag till en historisk-kartografisk undersökning. XVI + 136 + 14 p. Lund, BLOM, 1929. ISIS

Reviewed by E. LYMAN, *Geographical Journal*, 77, 263-65, 1931. " Dr. RICHTER has established OLAUS MAGNUS, ANTHONISZOON, MERCATOR, JORDEN, BURE, MÅNSSON, ÖRNEHUFWUD, MEJER, HUSMAN, and BUHRMAN as the chief original workers in Danish and Swedish cartography. Of the twenty-three maps reproduced, nine have never been printed before."

Taylor, Eva Germaine Rimington. Tudor geography 1485-1583. IX + 290 p., 16 pl., maps, ills. London, METHUEN, 1930. ISIS

Reviewed by GEORGE B. PARKS, *Geographical Review*, 21, 686-87, 1931.

VI. ANTHROPOLOGICAL AND HISTORICAL SCIENCES

(Knowledge of man, past and present)

34. ANATOMY

Choulant Ludwig. Geschichte und Bibliographie der anatomischen

Abbildung nach ihrer Beziehung auf anatomische Wissenschaft und bildende Kunst. Leipzig, WEIGEL, 1852.

Reviewed in *Second Janus*, 2, 162-167, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Hunter, Richard H. A short history of anatomy. 2nd ed. 87 p. London, BALE, 1931 (3 s. 6 d.). ISIS

This second edition has been revised to include the early evolution of anatomy, and some of the lesser-known anatomists; the unsavory story of the resurrectionists is told with relation to the Anatomical Act in Great Britain in 1832. A chronological table of twenty-eight great masters of anatomy from HIPPOCRATES to ROBERT KNOX is also added. C. A. K.

37. — PSYCHOLOGY (*human and comparative*)

Kretschmer, Ernst. The psychology of men of genius. Translated by R. B. CATTELL. XX + 256 p. (*International library of psychology, philosophy, and scientific method.*) London, KEGAN PAUL, 1931. ISIS

Menard, Pierre. L'écriture et le subconscient. Psychanalyse et graphologie, 172 p., 62 autographes et fig. Paris, ALCAN, 1931. ISIS

« L'écriture est l'inscription graphique de gestes non surveillés... La graphologie soulève donc des problèmes du plus haut intérêt, ceux de l'importance et de la signification de nos gestes et ceux de la subsconscience ». Ce sont les problèmes que l'auteur étudie dans cet ouvrage. Distinguant les signes graphiques des signes graphologiques, c'est-à-dire l'observation des gestes de leur interprétation, l'auteur groupe les gestes et les mouvements graphiques en 5 classes qui sont : l'énergie, la direction, l'étendue, la forme, le rythme. C'est à ce dernier qu'il consacre son plus long chapitre, estimant que « tout le subsconcient est inscrit dans le rythme de l'écriture. »

L. G.

(Murchison, Carl). A history of psychology in autobiography. Vol. 1. Edited with others by CARL MURCHISON. XIII + 516 p. *The International Univ. Series in Psychology.*) Worcester, Clark Univ. Press, 1930. ISIS

Reviewed by O. LIPMANN, *DLZ*, 2, 1482-84, 1931. Autobiographies of JAMES MARK BALDWIN, MARY WHITON CALKINS, EDOUARD CLAPARÈDE, RAYMOND DODGE, PIERRE JANET, JOSEPH JASTROW, F. KIESOW, WILLIAM MCDOUGALL, CARL EMIL SEASHORE, C. SPEARMAN, WILLIAM STERN, CARL STUMPF, HOWARD C. WARREN, THEODOR ZIEHEN, and H. ZWAARDEMAKER.

40. — ETHNOLOGY (*Primitive and popular science*)

Kanner, Leo. Medical folklore. *Medical Life*, 523-27, 1931. ISIS

Marconi, Enzo. Origini e motivi della circoncisione rituale. *Rivista di Storia delle Scienze Mediche e Naturali*, 22, 215-34, 1931. ISIS

Marcy, G. Origine et signification des tatouages de tribus berbères. *Revue de l'histoire des religions*, 102, 13-66, 1931. ISIS

Pearl, Raymond. Quotations. The history of a gesture. *Human Biology*, 2, 566-68, 1930. ISIS

Apropos of *The Pillars of Hercules; or, a Narrative of Travels in Spain and Morocco in* 1848 by DAVID URQUHART (1805-1877). A. P.

Wright, Jonathan. Medicine of primitive man—XV. *Medical Life*, 495-505, 1931. ISIS

Former installments of Medicine of primitive man by JONATHAN WRIGHT (1860-1928; for portrait, biographical sketch and bibliography see *Medical Life*, 35, 556-66, 1928) have appeared in *Medical Life* as follows : 1924, 483-89; 1925, 137-44, 181-86, 237-46, 316-22; 1926, 274-81; 1927, 41-46, 87-96, 358-408 (Primitive Medicine Number), 514-18; 1928, 366-72, 590-95; 1930, 337-42; 1931, 400-50.

41. — SUPERSTITION AND OCCULTISM

Kanner, Leo. Born with a caul. *Medical Life*, 528-48, 1931. ISIS

Kanner, Leo. Superstitions connected with sneezing. *Medical Life*, 549-75, 1931. ISIS

Egyptians; Hebrews; Hindus; Persians; Greeks; Romans; Mohammedans; Chinese; Japanese; Siamese; Australasians and Polynesians; African Negroes; Afro-Americans; American Indians; Christian nations.

Kanner, Leo. The teeth of gods, saints, and kings. Mythologic and historical contributions to dental folklore. *Medical Life*, 506-18, 1931. ISIS

49. — HISTORY OF RELIGION

(*Science and religion*)

Bastide, Roger. Les problèmes de la vie mystique. 216 p., *Collection Armand Colin*. Paris, COLIN, 1931 (10,50 fr.) ISIS

« Partant de cette idée que le mysticisme classique, tel qu'il est décrit dans les manuels catholiques, est le fruit d'une longue tradition, nous nous attacherons d'abord à découvrir les étapes de cette tradition, depuis le mysticisme spontané et orgiastique des primitifs jusqu'à son organisation actuelle : non pas histoire des doctrines mystiques, bien que doctrine et expérience se pénètrent étroitement, mais plutôt histoire de l'expérience mystique.

« Cette expérience, nous la découvrirons ensuite et nous nous apercevrons

alors qu'elle n'est pas un chapelet d'accidents bizarres mais bien plutôt une méthode de vie ou de détachement de la vie. Et il ne nous restera plus qu'à examiner enfin les diverses théories qui nous en proposent une explication, depuis celle des psychiatres jusqu'à celle des sociologues, en ayant soin, quelles que puissent être nos convictions personnelles, de réserver toujours le problème théologique. »

Bernhart, Joseph. Le Vatican trône du Monde. Edition française par EUGÈNE BESTAUX. 492 p., 16 figs. Paris, PAYOT, 1930 (40 fr.). ISIS

Histoire complète et détaillée de l'Église catholique et de la Papauté. Réunissant en soi toutes les formes de gouvernement, le Vatican est un phénomène intéressant pour qui cherche à pénétrer le sens profond de l'histoire. Il a passé par des heures glorieuses et tragiques, les rois ont essayé de se l'assujettir, mais sa solidité n'a pas été compromise. L'ouvrage est complété par une liste chronologique des papes et un index des noms propres. L. S.

Bolkestein, Hendrik. THEOPHRASTOS' Charakter der Deisidaimonia als religionsgeschichtliche Urkunde. 81 p. (*Religionsgsechichtl. Versuche u. Vorarbeiten.* Begr. v. ALBR. DIETERICH u. RICH. WÜNSCH. In Verbindg. m. LUDW. DEUBNER hrsg. v. LUD. MALTEN u. O. WEINREICH. Bd. XXI, H. 2.) Giessen, TÖPELMANN, 1929. ISIS

Reviewed by I. HEINEMANN, *DLZ*, 2, 1740-47, 1931.

Cumont, Fr. La fin du monde selon les mages occidentaux. *Revue de l'histoire des religions*, 103, 29-96, 1931. ISIS

Koets, Peter John. *Δεισιδαιμονία.* A contribution to the knowledge of the religious terminology in Greek. 110 p. Purmerend, Muusses, 1929. ISIS

Reviewed by I. HEINEMANN, *DLZ*, 2, 1740-47, 1931.

Krappe, Alexandre Haggarty. Mythologie universelle. 453 p. Paris, PAYOT, 1930 (40 fr.). ISIS

Ouvrage synthétique sur les divers systèmes mythologiques qui ont régné ou règnent encore dans les différentes régions qui constituent la surface du globe. Exposé objectif qui explique rationnellement les croyances en question. L'auteur étudie successivement l'histoire de la mythologie, les rapports de la mythologie et de l'ethnographie, le problème de la mythologie indo-européenne, le dioscurisme, la question des divinités thériomorphes et dendromorphes, les mythes de la royauté divine, la mythologie indienne, la mythologie iranienne, les mythologies arménienne, slave et baltique, la mythologie germanique, la mythologie celtique, la mythologie sémitique, la mythologie égyptienne, la mythologie africaine, les mythologies indonésiennes et océaniennes, les mythologies chinoise et japonaise, les mythologies finno-ougriennes et sibériennes, la mythologie américaine. Un index de 13 pages complète la bibliographie détaillée de chaque chapitre. L. S.

Saintyves, P. En marge de la légende dorée. Songes, miracles et survivances. Essai sur la formation de quelques thèmes hagiographiques. VIII + 596 p. Paris, EMILE NOURRY, 1931. ISIS

Les quatre premiers chapitres de cet ouvrage de SAINTYVES sur la formation des thèmes hagiographiques mettent en lumière le rôle des songes (croyance aux revenants, annonciation, rêves ambulatoires, les visionnaires du XIII[e] siècle jusqu'à nos jours, etc.). Les quatre chapitres suivants nous montrent comment agit le goût du merveilleux, soit grâce à des interventions plus ou moins intéressées (les résurrections d'enfants mort-nés, le pendu miraculeusement suspendu, les saints céphalophores, l'incorruptibilité des cadavres comme signe de sainteté). Les quatre derniers chapitres établissent combien est grande la puissance de la tradition, spécialement dans le domaine des survivances rituelles, non seulement parmi les clercs et les moines, mais même dans le peuple abandonné à lui-même (le miracle de l'apparition des eaux dans ses rapports avec la lithurgie; les sorts des saints et leurs modèles païens; l'histoire du chien et du serpent dans la littérature traditionnelle; l'amour des reliques et les vols de reliques). Parmi les appendices, un catalogue des saints céphalophores occupe 7 pages. L. G.

VII. MEDICINE

50. — HISTORY, ORGANIZATION, AND PHILOSOPHY OF MEDICINE

Browning, William. The relation of physicians to early American geology. *Annals of Medical History*, 3, 547-67, 1931. ISIS

Burn, C. B. Medical history of Michigan. Vol. I, XX + 829 p., 40 illus.; Vol. II, XI + 940 p., 23 illus. Minneapolis, BRUCE, 1930. ISIS

This great effort was largely written and entirely edited by Dr. BURN. J. H. DEMPSTER contributed a chapter on "Medical education in Michigan," W. H. SAWYER one on "Medical journalism," G. L. KIEFER on "Public health work," and R. R. SMITH on the "History of hospitals and nursing in Michigan." C. D. L.

Carus, C. G. Von den Forderungen der Zeit an eine Reform des Medicinalwesens. *Henschel's Janus*, 2, 155-92, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Cohn, Alfred E. Medicine, science, and art: studies in interrelations. XIII + 212 p., 2 pl. Chicago, University Press, 1931. ISIS

Beautifully printed collection of six essays, some previously published: The difference between art and science in their relation to nature; The development of the Harveian circulation (*Am. Med. Hist.*, 1, 16, 1929); Purposes in medical research (*Journ. Clin. Inves.*, 1, 1, 1924); Medicine and

science (*Journ. of Philos.*, 25, 403, 1928); Physiology and medicine (*Science*, 68, 511, 1928); The hierarchy of medicine. "The chief reason for writing them was to make clear to myself the views and opinions and the systematic relations of those bits of the world, at least, which required ordering within my own mind." Good material treated conservatively. C. D. L.

DaCosta, John Chalmers. Selections from papers and speeches. VII + 440 p., 12 pl., illus. Philadelphia, SAUNDERS, 1931. ISIS

Recalling the literary style of HOLMES in medico-historical writings, though briefer, these essays range from a sketch of "Medical Paris during the reign of LOUIS PHILIPPE" to a discussion of "Suicide." There are included biographical and historical notes on NAPOLEON'S surgeon, Baron LARREY (1766-1842), the old Blockley and Jefferson Hospitals, Philadelphia, Dr. S. W. GROSS (1805-1884), and Dr. C. W. LONG (1815-1878). C. D. L.

Daremberg, Ch. Essai sur la détermination et les caractères des périodes de l'histoire de la médecine. 43 p. (Abdruck aus der *Gazette médicale de Paris*, 1850). Paris, BAILLIÈRE, 1850. ISIS

Reviewed by J. G. THIERFELDER, *Second Janus*, 1, 129-37, 1851; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Dawson, Bernard. The history of medicine : a short synopsis. XIV + 160 p., 31 illus. London, LEWIS, 1931. ISIS

Seven short lectures delivered at the University of Adelaide and based chiefly on SINGER'S "Short History," and OSLER'S "Evolution." Are these not available in Australia that this publication was needed? C. D. L.

Diepgen, Paul. Der Deutsche Ärztevereinsbund und seine Zeit bei der Gründung und heute. Über die Aufgaben einer Geschichte des Bundes. *Deutsches Ärzteblatt*, Nr. 18, 11 p., 1931. ISIS

Diepgen, Paul. Vitalismus und Medizin im Wandel der Zeiten. *Klinische Wochenschrift*, 10, 1433-38, 1931. ISIS

Häser, H. Lehrbuch der Geschichte der Medicin und der Volkskrankheiten. Jena, 1845. ISIS

Reviewed by F. ROMEO-SELIGMANN, *Henschel's Janus*, 1, 856-58, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Haeser, H. Lehrbuch der Geschichte der Medicin und der epidemischen Krankheiten. Zweite gänzlich umgearbeitete Auflage. Erste Abtheilung, 512 p. Jena, MAUKE, 1852. ISIS

Reviewed by M. LANDSBERG, *Second Janus*, 2, 612-37; 1852; reprinted, ALFRED LORENTZ, 1931.

Henschel, A. W. E. Th. Ein Blick auf das Ganze der Geschichte

der Medicin. *Henschel's Janus*, 3, 1-28, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Henschel, A. W. E. Th. Ist die Geschichte der Medicin an der Zeit? Einleitende Worte. *Second Janus*, 1, 1-23, 1851 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Henschel, A. W. E. Th. Janus mythologisch sich selbst bevorwortend. *Henschel's Janus*, 1, 1-14, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Henschel, A. W. E. Th. Das medicinische Doctorat, seine Nothwendigkeit und seine nothwendige Reform. *Henschel's Janus*, 3, 547-66, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Heusinger, C. F. Die ärztlichen Codices in Monte-Cassino, nach TOSTI storia della Badia di Monte-Cassino. *Henschel's Janus*, 3, 217-24, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

LUIGI TOSTI, 1811-1897. Storia della badia di Monte-Cassino, 3 vols., Naples, 1842-43.

Isensee, Emil. Die Geschichte der Medicin und ihrer Hülfswissenschaften. I. Theil : Aeltere und mittlere Geschichte 1840. (Erstes und zweites Buch.) II. Theil : Neuere und neueste Geschichte. 1. Abtheilung : Naturwissenschaften. 1842. (III. Buch.) Geschichte der Medicin, Chirurgie, Geburtshülfe, Staatsarzneikunde, Pharmacie u. a. Naturwissenschaften und ihrer Literatur. Zweiter Theil. Neuere und neueste Geschichte -IV. Buch 1843. —V. Buch 1844. —VI. Buch 1845, nebst der Inhaltsübersicht zum II. Theil (3.-6. Buch) u. d. Generalregister. (Auch unter dem Titel : Neuere und neueste Geschichte der Heilwissenschaften und ihrer Literatur usw. ohne Theil-Bezeichnung, mit Inhaltsangabe). Berlin, LIEBMANN, 1840-1842 ; NAUCK, 1843-1845. ISIS

Reviewed by J. C. F. HARLESS, *Henschel's Janus*, 2, 199-209, 1847; reprinted, ALFRED LORENTZ, 1931.

Joseph, G. Geschichte der Physiologie der Herztöne vor und nach LAËNNEC bis 1852. *Second Janus*, 2, 1-39, 345-74, 505-27, 1852 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Landsberg, M. Ueber das Alterthum des Aderlasses. Ein Beitrag zur Geschichte der Medicin. *Second Janus*, 1, 161-92, 1851 ; 2, 89-141, 1852 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Linderer, J. Die Zahnheilkunde nach ihrem neuesten Standpuncte.

Ein Lehrbuch für Zahnärzte und Aerzte. XII + 482 p., 6 pl. Erlangen, PALM und ENKE, 1851. ISIS

Reviewed by J. G. THIERFELDER, *Second Janus*, 2, 488-91, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Löwenstein, J. S. Biographien und Schriften der ordentlichen Professoren der Medicin an der Hochschule zu Frankfurth a. O. in den Jahren 1506 bis 1811. *Henschel's Janus*, 3, 283-315, 419-43, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Manfré, Pasquale. Storia della medicina. Parte 1. Vol. 1. 418 p. Naples, 1844. ISIS

Reviewed by C. F. HEUSINGER, *Henschel's Janus*, 2, 609-17, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Morejon, Antonio Hernandez. Historia bibliografica de la medicina española. 3 vol. Madrid, 1842. ISIS

Reviewed by C. F. HEUSINGER, *Henschel's Janus*, 2, 609-17, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Nevermann, J. F. Der Steinschnitt, eine der ältesten Operationen der Chirurgie. *Henschel's Janus*, 1, 791-98, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Oslander, J. F. Einige geschichtliche Beiträge zur Medicin und Geburtshülfe. *Henschel's Janus*, 1, 753-63, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

ALPHONSE LEROY; Die ältesten Beobachtungen über die Exstirpation der vorgefallenen Gebärmutter; ROUSSET über FRANCO; Vorfall der Nachgeburt mit Lebensrettung des Kindes; Ueber die vormals häufigen und jetzt verschwundenen Tertianfieber in Göttingen.

(Paris). Förderung des medicinischen Geschichtsstudiums in Paris. *Henschel's Janus*, 3, 833-34, 1848; reprinted, ALFRED LORENTZ, 1931. ISIS

Parsons, Robert P. History of Haitian medicine. Foreword by EDWARD R. STILT. XXVIII + 196 p., 21 ill., 1 map. New York, HOEBER, 1930. ($ 2.25.) ISIS

Les figures les plus caractéristiques parmi les médecins dont Haïti doit garder le souvenir sont celle de PORTER K. LOWELL (1809-1845), et celle de LÉON AUDAIN. Pour le reste, l'auteur insiste surtout sur le développement apporté au service de l'hygiène publique depuis l'occupation américaine.

L. G.

Plarr's Lives of the Fellows of the Royal College of Surgeons

of England. The Thelwell Thomas Memorial. Revised by Sir D'Arcy Power, with assistance of W. G. Spencer and G. E. Gash. Vol. I, xxvi + 752 p.; vol. II, 596 p. London, Royal College of Surgeons, 1930. ISIS

Based on the biographical data assembled by the late librarian of the College, Victor G. Plarr (1863-1929), this monumental work will equal in importance the famous *Roll of the Royal College of Physicians of London* written by William Munk (1st ed. 1861; 2nd ed., 1878).

Prefacing the Charter granted by Queen Victoria in 1843 is a short but illuminating note on the English surgeons: "The rank and file of surgeons have always been a wilful and perverse generation, turbulent and claiming rights which they never had. Unsuccessful in the fifteenth century, the Fraternity of Surgeons allied itself with the Barbers in 1540. No sooner had they done so than they sought to dissolve the partnership, and this they accomplished at length in 1745. Having set up a company of their own, negligence and inattention to detail led to its failure in 1796. In 1800 the College of Surgeons was founded in London by Royal Charter, and in the course of the century by mere changes of title became the Royal College of Surgeons of England."

The present volumes contain notes only on Fellows since 1843, when the order was established. The bibliographies are unusually well written and succinct, and are arranged alphabetically. It is proposed to issue a supplement every ten years. C. D. L.

Power, Sir **D'Arcy.** The foundations of medical history. With an introductory note by William H. Welch. x + 182 p. Baltimore, Williams and Wilkins, 1931. ISIS

Six lectures by Sir D'Arcy as the first visiting lecturer at the Institute of the History of Medicine at The Johns Hopkins University. "Acting in this capacity at a newly founded institution it seemed more appropriate to point the way along several roads rather than to treat a single subject exhaustively." The lectures include: The story of the oldest British hospital (St. Bartholomew's London, built 1123); Dining with our ancestors; Biography; Iconography; Bibliography, and "Aristotle's masterpiece." The latter is an enlightening discussion of the popular preservation of mediaeval biological lore. The lectures are in Sir D'Arcy's most delightful style, and are equally rich in stimulating ideas and interesting information. C. D. L.

Power, Sir **D'Arcy.** Touchpieces and the cure of the King's evil. *Ann. Med. Hist.*, 3, 127-33, 5 ill., 1931. ISIS

Renouard, P. V. Histoire de la médecine depuis son origine jusqu'au XIX^e^ siècle. Tome I et II. 468 + 524 p. Paris, Baillière, 1846. ISIS

Reviewed by L. Choulant, *Henschel's Janus*, 2, 401-10, 1847; reprinted, Alfred Lorentz, Leipzig, 1931.

Renzi, Salvatore de. Storia della medicina Italiana. Vol. 1, 2, 3. Naples, 1845. ISIS

Reviewed by C. F. HEUSINGER, *Henschel's Janus*, 2, 609-17, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Sachse, J. D. W. Verzeichniss von Bildnissen von Aerzten und Naturforschern seit den ältesten bis auf unsre Zeiten, mit Biographien. Erstes Heft : Abano-Azzoguijoi. VI + 93 p. Schwerin, MARCUS, 1847. ISIS

Reviewed by L. SPENGLER, *Henschel's Janus*, 3, 813-14, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Schrenk. Die Krankheiten und die Medicin der Samojeden. (Reise in die Tundren der Samojeden, I., S. 546.) *Second Janus*, 1, 320-22, 1851 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Seidenschnur, Otto. Beiträge zur Kenntniss medicinischer Gedichte. *Henschel's Janus*, 2, 772-806, 1847 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Sigerist, Henry E. Grosse Ärzte. 68 ill. München, LEHMANN, 1931. ISIS

Spengler, L. Beiträge zur Geschichte der Medicin in Mecklenburg. VIII + 49 p. Wiesbaden, KREIDEL, 1851. ISIS

Reviewed by J. G. THIERFELDER, *Second Janus*, 2, 649-50, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Spengler, L. Bruchstücke aus der Geschichte der Medicin in Meklenburg. *Henschel's Janus*, 3, 687-743, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Sprengel, Kurt. KURT SPRENGEL's Versuch einer pragmatischen Geschichte der Arzneikunde. Vierte Auflage. Mit Berichtigungen und Zusätzen versehen von JULIUS ROSENBAUM. I. Bd. Aelteste Geschichte der Medicin bis zur empirischen Schule. XVIII + 644 p. Leipzig, GEBAUER'sche Buchhandlung, 1846. ISIS

Reviewed by J. G. THIERFELDER, *Henschel's Janus*, 3, 349-50, 1848; reprinted, ALFRED LORENTZ, Leipsig, 1931.

Striker, Wilh. Die Geschichte der Heilkunde und der verwandten Wissenschaften in der Stadt Frankfurt am Main. Nach den Quellen bearbeitet. VIII + 368 p. Frankfurt a. M., 1847. ISIS

Reviewed in *Henschel's Janus*, 3, 351-56, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Wilson, Robert McNair. A history of medicine. (BENN's sixpenny library no. 148.) London, BENN, 1930. ISIS

Reviewed by F. M. G. DE FEYFER, *Bijdragen tot de geschiedenis der geneeskunde*, 11, 243, 1931.

Warthin, Alfred Scott. The physician of the dance of death. A historical study of the evolution of the dance of death mythus in art. XVI + 142 p., 92 illus. New York, HOEBER, 1931. ISIS

51. — EPIDEMIOLOGY, HISTORY OF SPECIAL DISEASES. PUBLIC HEALTH AND SOCIAL MEDICINE

Berg, Tr. Th. Sammandrag af officiella rapporter om Cholerafarsoten i Sverge ar 1850. Stockholm, 1851. ISIS

Reviewed by ED. LORANT, *Second Janus*, 2, 321-44, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Daremberg, C. Notices sur l'antiquité et l'endémicité de la peste en Orient et particulièrement en Egypte. 11 p. (No. 1 des " Pièces et documents à l'appui du rapport sur la peste et les quarantaines," 1847.) ISIS

Reviewed by A. W. E. TH. HENSCHEL, *Henschel's Janus*, 3, 815-18, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Elgood, C. Translation of a Persian monograph on syphilis entitled Risála-i-átishak by IMÁD-UL-DÍN MAḤMÚD BIN MASCÚD BIN MAḤMÚD-UL-ṬABÍB. *Annals of Medical History*, 3, 465-86, 1931. ISIS

Fuchs, C. F. Das Verhältniss der Krankheiten in senkrechter Richtung von der Küste der Nordsee bis zum Rücken des Thüringerwaldes. *Second Janus*, 1, 66-87, 1851 ; 2, 40-89, 294-320, 527-611, pl., 1852 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Günsburg, Friedrich. Zur Geschichte der neusten Leistungen in der Pathologie der Nervenlähmungen. *Henschel's Janus*, 2, 380-92, 1847 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Haeser, H. Zur Geschichte der BRIGHT'schen Krankheit. *Henschel's Janus*, 3, 371-72, 1848 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Haeser, H. Ueber die Spuren einer Kenntniss des Scharlachs bei den Aerzten des 10ten bis 15ten Jahrhunderts. *Henschel's Janus*, 1, 116-26, 1846 ; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Hamer, Sir William. Epidémiologie ancienne et nouvelle. Collection franco-britannique des sciences médicales et biologiques. 182 p. ill., GASTON DOIN, Paris, 1931. ISIS

Sir WILLIAM HAMER montre, par l'étude des groupes d'épidémies qui se manifestèrent simultanément en différents points de l'Europe aux XV^e^ et XVI^e^ siècles, au moment des suettes, par des comparaisons avec les épidémies de WILLIS en 1657 et 1658, qui coïncidèrent avec la léthargie épidémique de Copenhague, enfin par l'étude des Constitutions décrites par SYDENHAM, que les vagues pathologiques qui ont de nouveau désolé Londres de 1915 à 1925 n'ont rien de neuf; seuls auraient changé les noms des maladies. Et les anciennes données épidémiologiques d'HIPPOCRATE, reprises et renforcées par SYDENHAM lui semblent encore à considérer aujourd'hui. L'épidémiologie, qui a périclité depuis l'ère de la bactériologie, doit reprendre ses droits, et les observations de la pratique sont aussi nécessaires que les observations du laboratoire.

L. G.

Helfft, Dr. Zur Geschichte der Influenza. ISIS

Reviewed in *Henschel's Janus*, 3, 828-32, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Heusinger, C. F. Ein Beitrag zu den Antiquitäten der Noma. *Second Janus*, 1, 127-28, 1851; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Heusinger, C. F. Der Cak in Sennaar. Eine epidemische, wahrscheinlich dem Maispellagra u. s. w. zu vergleichende Krankheit. *Henschel's Janus*, 1, 296-99, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Heusinger, C. F. Die von den Englischen Aerzten in Ostindien unter dem Namen " Burning of the feet " beschriebene Krankheit. Ein Beitrag zur Geschichte der Kriebelkrankheit. *Henschel's Janus*, 1, 257-95, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Study of ergotism.

Heusinger, C. F. Die maculösen Leproiden, nach ihrer Verbreitung und nach ihren Ursachen, so wie in ihrem Verhältniss zur Geschichte des Aussatzes. *Henschel's Janus*, 3, 495-524, 794-812, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Jahn, F. Beiträge zur Geschichte der Carbunkel-Krankheiten mit Ausschluss der Pest. *Henschel's Janus*, 1, 367-414, 485-550, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Landsberg, M. Wechselfieber und Milzanschwellung. *Henschel's*

Janus, 3, 358-60, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Leubuscher, Rud. Der Wahnsinn in den vier letzten Jahrhunderten. Nach dem Französischen des CALMEIL bearbeitet. VIII + 296 p. Halle, SCHWETSCHKE, 1848. ISIS

Reviewed by A. W. E. TH. HENSCHEL, *Henschel's Janus*, 3, 819-20, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Malloch, Archibald. Lead poisoning. *Annals of Medical History*, 3, 455-58, 1931. ISIS

Metz, Dr. Die Ruhr als Epidemie und als Krankheit im Individuum, mit besonderer Rücksicht auf ihren epidemischen Verlauf im Egerithale während den Jahren 1841, 1842 und 1843. 101 p. Zürich, 1844. ISIS

Reviewed by H. HAESER, *Henschel's Janus*, 2, 410, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Montgomery, Douglass W. The naming of Alopecia areata. *Annals of Medical History*, 3, 540-46, 1931. ISIS

Neumann, Heinrich. Ueber die öffentliche Irrenpflege im achtzehnten und neunzehnten Jahrhundert. *Second Janus*, 2, 141-51, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Norman, Herbert J. Some factors in the reform in the treatment of the insane. *Proc. Roy. Soc. Med.*, 24, 1068-74, 1931. ISIS

Phiraeus, D. I. De hydrophobiae historia antiquissima, aetiologia et therapia. Diss. inaug., Würzburg, 1849. ISIS

Reviewed by A. W. E. TH. HENSCHEL, *Second Janus*, 2, 495, 1852; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Schleisner, P. A. Forsög til en Nosographie of Island. 101 p. Copenhagen, 1849. ISIS

Reviewed by A. W. E. TH. HENSCHEL, *Second Janus*, 1, 298-318, 1851; reprinted, ALFRED LORENTZ, 1931.

Schleisner, P. A. Island undersögt fra et laegevidenskabeligt Synspunkt. 198 p. Copenhagen, 1849. ISIS

Reviewed by A. W. E. TH. HENSCHEL, *Second Janus*, 1, 318-19, 1851; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Seidenschnur, Otto. Ein Beitrag zur Geschichte des Englischen

Schweisses. *Henschel's Janus*, 1, 161-82, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Seitz, Franz. Bemerkungen über die ältere französische Literatur des Pestilenzialtyphus. *Henschel's Janus*, 3, 444-55, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Spencer, Herbert R. The history of British midwifery from 1650 to 1800. XXIV + 185 p., 9 pl. London, BALE, 1927. ISIS

The Fitz-Patrick lectures before the Royal College of Physicians of London for 1927. A well organized and informative survey in a hitherto neglected field. A short account, based on AVELING (*The Chamberlens and the midwifery forceps*, London, 1882) is given of the amazing CHAMBERLENS who by their secret invention of the obstetric forceps dominated British midwifery for a century. An evaluation is made of the contributions of the chief British writers on midwifery: WILLIAM HARVEY (1578-1657); JOHN MAUBRAY (d. 1732); Sir RICHARD MANNINGHAM (1690-1759); Sir FIELDING OULD (1710-1789); WILLIAM SMELLIE (1697-1763); WILLIAM HUNTER (1718-1783); JOHN BURTON (1710-1771); JOHN LEAKE (1729-1792); CHARLES WHITE (1728-1813); WILLIAM PERFECT (1737-1809); WILLIAM OSBORNE (1736-1808); THOMAS DENMAN (1735-1815) and others. This is a discussion of puerperal fever and a general review of the status of British obstetrics. A list of British lying-in institutions is appended. There are good bibliographical references, and an index. C. D. L.

Stitt, E. R. Our disease inheritance from slavery. *U. S. Nav. Med. Bull.*, 26, 801-17, 1928. ISIS

While Europeans probably introduced tuberculosis, small-pox, and scarlet-fever into the New World, African slaves seem to have been responsible for subtertian malaria and blackwater fever, bacillary dysentery, hook-worm, filariasis, leprosy, and yellow fever. Guinea worm, trypanosomiasis, and bilharziasis failed to secure a foot-hold. Yaws did not develop in the United States as it did in the West Indies. C. D. L.

Thomson, Sir St. Clair. The historical evolution of oto-laryngology. *Proc. Roy. Soc. Med.*, 24, 1074-80, 1931. ISIS

Van Andel, M. A. Geneeskunde en hygiene op de slavenschepen in den compagnietijd. *Nederl. Tijdschr. v. Geneesk.*, 75, 614-37, 1931. ISIS

Excellent survey of hygiene in the slave ships of the West India Company, 17th and 18th centuries. Discusses medical inspection in Africa, hygienic measures in transport, food and quarters provided, data on epidemics and quarantine regulations. The hygienic measures, " which read uncommonly sound, were dictated solely by considerations of the immediate financial loss produced by sickness and death." C. D. L.

52. — HISTORY OF HOSPITALS AND OF MEDICAL TEACHING

Alberti, Julius Gustav. Der Stand der Aertze in Preussen. Ein historisch-kritischer Versuch, mit Beziehung auf die bevorstehende Reform des preussischen Medicinal-Wesens. 143 p. Leipzig, BROCKHAUS, 1846. ISIS

Reviewed by J. ROSENBAUM, *Henschel's Janus*, 1, 699-702, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Arlt, C. F. Die Anstalten für Blinde und Augenkranke in Prag. Historische Skizze. 30 p., port. Prag, 1846. ISIS

Reviewed by L. SPENGLER, *Henschel's Janus*, 1, 702-04, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Bergounioux, J. Concours et thèses de concours pour le professorat en médecine de l'Université de Cahors de 1611 à 1715. *Bulletin de la Société française d'Histoire de la Médecine*, 25, 223-64, 1931. ISIS

Bourguignon, E. Notes pour servir à l'histoire de l'ancienne école de médecine de Strasbourg. Thèse inaug. Strasbourg, 1849. ISIS

Reviewed by A. W. E. TH. HENSCHEL, *Second Janus*, 1, 293-95, 1851; reprinted, ALFRED LORENTZ, Leipzig, 1931.

Loth, E. Gdanska skola anatomiczna (1584-1812). Folia morphologica, 1, 98-99, 1929 (Polish). ISIS

Biographical notes on the Danzig anatomists, JOHANNES MATHESIUS (1584-1607), JOACHIMUS OLHAFIUS (1603-1630), ADRIANUS PAULI (1611-1622), TOBIAS MAIUS (1631-1632), LAURENTIUS EICHSTADIUS (1647-1660), GEORGES SEGERUS (1675-1678), ERNST GOTTFRIED HEYSE (1688-1692), JOHANNES GLOSEMEYER (1696-1711), JOHANNES ADAMUS KULMUS (1725-1745), CHRISTIAN SENDELIUS (1745-1789), EPHRAIM WILHELM BLECH (1787-1812).

Rönne, Ludwig v.; Simon, Heinrich. Das Medicinalwesen des Preussischen Staates dargestellt unter Benutzung des Archivs des Ministeriums der Geistlichen-, Unterrichts- und Medicinal- Angelegenheiten. 1. Thl. VII + 786 p. II. Thl. 628 p. Breslau, ADERHOLZ, 1844 u. 1846. ISIS

Reviewed by J. ROSENBAUM, *Henschel's Janus*, 1, 867-70, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931.

West, Eva. The William Bebb collection of prints of Paris hospitals. *California and West. Med.*, 33, 809-12, 1930. ISIS

53. — PHARMACY. PHARMACOLOGY. TOXICOLOGY.

Häfliger, Josef Anton. Pharmazeutische Altertumskunde und die Schweizer Sammlung für historisches Apothekenwesen an der Universität Basel. 203 p., 32 pl. Basel, WEPF, 1931. ISIS

Harless, Fr. Ueber das Nitrum der Alten, seine Varietäten, und seine Gewinnungsweise. Ein Beitrag zur Geschichte der Materia medica im Alterthume. *Henschel's Janus*, 1, 455-84, 1846; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

See also J. G. THIERFELDER's paper on the same subject. *Henschel's Janus*, 3, 29-53, 1848.

La Wall, Charles H. The history of quinine. *Med. Life*, 38, 195-216, 1931. ISIS

Meyer-Ahrens, Konrad. Kurze Mittheilung über die Zürcherischen Apotheken im XVI. und XVII. Jahrhundert. Ein Beitrag zur Geschichte der Pharmacie. *Henschel's Janus*, 3, 98-110, 1848; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

Ramsbottom, J. Jesuits' bark. *Natural History Magazine*, 3, 17-25, 1931. ISIS

The history of the use of cinchona from 1630 to the present day.
C. W. A.

Stricker, Wilh. Die Frankfurter Pillen, ein berühmtes Geheimmittel des siebzehnten und achtzehnten Jahrhunderts. *Henschel's Janus*, 2, 397-99, 1847; reprinted, ALFRED LORENTZ, Leipzig, 1931. ISIS

VIII. EDUCATION

(The methods of accumulating, imparting and diffusing knowledge)

54. — EDUCATION (*generalities, methods, colleges, universities*)

Barker, Ernest. Universities in Great Britain, their position and their problems. 98 p. London, Student Christian Movement, 1931. ISIS

Bertrand, François Louis. L'analyse psycho-sensorielle et ses applications à l'éducation intégrale. 302 p., 4 pl. Paris, ALCAN (sans date, 1930?) (40 fr.). ISIS

Disciple d'A. BINET, l'auteur coordonne dans cette thèse les observations qu'il a faites lui-même et fait réunir par ses collaborateurs pendant vingt cinq ans dans divers milieux scolaires très différents, au moyen de tests nombreux portant surtout sur l'attention et la distraction chez l'enfant : le niveau mental de l'écolier peut être déterminé avec certitude par l'examen de la cinesthésie « sensibilité dynamique diffuse qui évolue ontogénétiquement, de l'émotion viscérale à l'affectivité et au sentiment. » L. G.

Carpelan, Tor. Helsingfors Universitets Studentmatrikel 1828-1852. Utgiven med. understöd av Universitetet till 100-års minnet av dess flyttning till Helsingfors. IX + 245 p. (*Svenska Litteratursällskapet i Finland* CCIII : 1 u. 2.). Helsingfors, 1928-1930. ISIS

(Johns Hopkins University). Report of the director of the Institute for Biological Research, 5, 11 p., 1929-1930. Reprinted from the Report of the President of the University, 1929-1930. ISIS

56. — BIBLIOGRAPHY (*methods, libraries*)

Hargrave, Catherine Perry. A history of playing cards and a bibliography of cards and gaming. Compiled and illustrated from the old cards and books in the collection of the United States Playing Card Company in Cincinnati. XXIV + 468 p. New York, HOUGHTON MIFFLIN, 1930. ISIS

Jackson, Holbrook. The anatomy of bibliomania. Two volumes. New York, SCRIBNERS, 1931. ISIS

Miner, John R. The cost of biological books in 1930. *Quarterly Review of Biology*, 5, 490-92, 1930. ISIS

Smith, Wilbur M. A list of bibliographies of theological and Biblical literature published in Great Britain and America, 1595-1931. With critical, biographical, and bibliographical notes. VIII + 57 p. Coatesville, Pennsylvania, 1931. ISIS

59. — ERRATA. SERIES 23

(*For previous errata, see* ISIS, 16, 575)

Isis, 15, 262, last note, read : HERRMANN, ALBERT.
15, 600, line 17, read : NEUGEBAUER, O.
16, 448, line 9, read : 16, 502.
16, 513, line 12, read : 550.
16, 550, line 4 from bottom, read : 512-14.

16, 563, line 2 from bottom, read : THOMPSON, CHARLES JOHN SAMUEL.

17, 171, line 5 from bottom, read physiologie, instead of physionomie.

18, 87, line 6 from bottom, read : *Isis*, 15, 47-96.

A few other misprints are not mentioned in these errata because they are too obvious to cause any error or confusion. I wish to express my thankfulness to the readers who take the trouble to make the above-mentioned corrections in their set of *Isis*. I would advise them, after having accomplished that little task, to write their initials near mine at the bottom of this note to indicate that these and the previous errata have been taken into account. G. S.

These and the previous errata have been corrected by...

Index of Authors Included in the Thirty-third Bibliography

The Roman figures refer to centuries ; the Arabic figures, to the sections of Parts II and III, which are numbered consecutively from 1 to 59. This index will enable one to find more easily the papers analyzed in the present bibliography, and also to see at a glance what each writer is doing.

January, 1932. FRANCES SIEGEL.

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